Diseases of Blackgram and Greengram

(An Annotated Bibliography)

1918-1988

S. C. Agrawal
Scientist Plant Pathology

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PREFACE

Greengram (Vigna radiata) and Blackgram (Vigna mungo) are important pulse crops grown and utilized extensively in India and South east Asia. Both these crops are attacked by several serious diseases caused by fungi, viruses, Nematodes and Bacteria. Large amount of work has been done on various aspects of diseases of these crops still a lot has to be done particularly in regard on virus diseases.

This bibliography has been compiled to provide a working file of literature to Scientists engaged in this field of research. It includes 864 references, with abstracts, arranged numerically in alphabetical order. The author index is given in alphabetical order and the serial number of reference in which name of a author appears is mentioned against his name. The subject index is divided in different groups i.e. Fungi, Bacteria, Viruses, Nematodes, Nonparasitic causes, Vectors, Diseases in general, Host Pathogen interaction, seed pathology, and control and Miscellaneous. The control is further divided in Biological, Chemical, Cultural and Resistance. A citation covering more than one group is referred under all respective groups. An addenda has also been given.

Efforts have been made to include maximum available world literature from different journals, periodicals, symposia etc. However, omissions and inaccuracies are inevitable. I will highly appreciate the readers to bring the omissions and errors to my notice for further improvement as I am intended to publish it in a book form.

Sehore
22.8.89

S.C.Agrawal

SYNONYMY

1. Blackgram

Common names: Blackgram, urdbean, mash
Botanical name: Vigna mungo (L.) Hepper
Synonym : Phaseolus mungo

2. Greengram

Common names : Greengram, goldengram, mungbean
Botanical name: Vigna radiata (L.) Wilczek
Synonym : Phaseolus aureus
Phaseolus radiatus

Some taxonomists have grouped these two species into the single but diverse species Vigna radiata and recognised both as two races i.e. V.radiata var. mungo and V.radiata var. aureus for blackgram and greengram, respectively.

ACKNOWLEDGEMENTS

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I am very much thankful to Shri B.P. Singh for correctly & timely typing of bibliography and Shri D.L. Malviya and L.C. Patle for help in various ways.

B I B L I O G R A P H I C A L E N T R I E S

1. Abu Kassim, A.B., Abdul Rahman, H.B. and Zainal, A.B. 1977. Mungbean in West Malaysia. I International Mungbean Symposium, AVRDC, Taiwan: 15-17.

   Severe Corticium (= Rhizoctonia) solani leaf blight was observed at Serdang MARDI. Application of benomyl begining at first appearance are generally made to reduce spread. Occasionally scattered occurrence of stem rot (Pythium sp.) and leaf rot (S. rolfsii) were found. In 1975 yellow mottling disease presumably sap transmissible virus was seen in mungbean variety M-350.

2. Abu Kassim, A.B. 1981. Pest and disease problems of mungbean in West Malaysia. Malaysian Agricultural Journal, 53: 29-33.

   Among the pathogens reported on Vigna radiata are Cercospora canescens and Rhizoctonia solani. Two presumed virus diseases have been designated mungbean yellow mottle and mungbean mosaic and both sap-transmissible.

3. Agrawal, H.S., Gupta, M.K., Prasad, V.K. and Vishwakarma, S.L. 1979. Chemical control of yellow mosaic of moong. Pesticides, 13(5): 44-47.

   Field trials on mungbean at Hardoi reveal Nuvan (DDVP), Nuvacron (Monocrotophos) and Phosphomidan reduce incidence and increased yields in all except Zaid season 1976. Two sprays at 15 days interval of compounds at 500, 875 & 250 ml/ha respectively are recommended.

4. Agrawal, K.C. and Philip, R. 1983. Economic control of powdery mildew of urid (Phaseolus mungo) by wettsulf. Indian Phytopathology, 36: 359-361.

   The most economical control of Erysiphe polygoni on Vigna mungo was achieved with 3 sprays (0.3% at 900 litres/ha) at an interval of 12 days after the appearance of the disease.

5. Agrawal, P.C., Mehta, S.L., Patel, P.N. and Jindal, J.K. 1981. Variability in Xanthomonads of grain legumes. V. Comparison of soluble protein patterns by Disc gel electrophoresis. Indian Phytopathology, 34: 442-448.

   Soluble protein pattern (SPP) in 42 pulse Xanthomonas cultures including those from mung and urdbean showed distinct SPP and pathovar specificity. Isolates within a pathovar showed some differences but there was no correlation between the SSP of an isolate and its geographic distribution, virulence, attackability, colony variation and phage sensitivity. Within X. c. pv. phaseoli different host isolates differred in SSP except few.

6. Agrawal, S.C. and Nema, Sushma 1984. Plant Pathology. In Annual Report Kharif Pulses (1983-84). All India Pulse Improvement Project, R.A.K. College of Agriculture, Sehore : 30-41.

   During the survey of pulse diseases around Sehore Cercospora leaf spot and Macrophomina leaf blight of urd and mungbean were observed and their severity ranged 15-50% and traces respectively. Leaf crinkle of urdbean varied 5-15 % while anthracnose was noticed in traces only. During 1984, Protomycopsis leaf spot was observed on urdbean.

7. Agrawal, S.C. and Nema, Sushma 1988. Resistance in mungbean and urdbean against powdery mildew. Indian Journal of Pulses Research, 2: 1

   Out of 170 entries of mungbean scored against powdery mildew during 1982 to 1987, twelve had less than 3 disease grade. Minimum being 0.8 in ML 395 and ML 223 on 0-9 point scale basis. None was free. Out of 85 urdbean entries LBG 17 was free while 6 others had less than 3 disease grade.

8. Agrawal, S.C. and Nema, Sushma 1989. Effect of carbendazim on Macrophomina leaf blight of black gram and green gram. Indian Journal of Plant Protection, 17: 147 - 149

Seed treatment with carbendazim 1 g/kg seed checked seed rot and seedling blight of black gram and green gram caused by Macrophomina phaseolina. It reduced primary inoculum on seed and thus affected leaf bbight phase. The disease severity was reduced by spray of carbendazim (0.05%). It checked yield losses & improved seed quality by increasing seed weight and fungal infection. reduc ion.

9. Agrawal, V.K., Mathur, S.B. and Neergaard, P. 1972. Some aspects of seed health testing with respect to seed-borne fungi of rice, wheat, black gram, green gram and soybean grown in India. Indian Phytophathology, 25: 91-100.

The blotter method proved better than the agar plate method for testing seed-borne fungi of rice, wheat, black gram, green gram and soybean. Seed treatment is discussed. Myrothecium roridum on mung and urdbean seed is recorded.

10. Agrawal, V.K., Beniwal, S.P.S. and Verma, H.S. 1976. Note on transmission of bean common mosaic virus in seeds of green gram (V. radiata (L.) Wilczek). Pantnagar Journal of Research, 1: 81-82.

Seed borne nature of BCMV is reported in black gram by Sahare and Raychowdhury (1963). Nene & Shrivastava (1972) described that mosaic mottle of black gram is also seed borne. The causal virus was identified as a strain of BCMV by Singh (1974). They also observed mosaic mottle symptoms on green gram. Kaiser and Mossahebi (1974) from Iran reported that the BCMV is seed transmitted in green gram. In present study BCMV was seed borne in all the 17 germplasm of mungbean tested. The rate of transmission varied from 2-14% which is new report for green gram.

11. Agrawal, V.K., Nene, Y.L. and Beniwal, S.P.S. 1976. Influence of bean common mosaic virus infection on the flower organelles, seed characters and yield of uridbean. Indian Phytopathology, 29: 444-445.

In glass house pot culture tests with P. mungo var. UPU-2, 83% loss in yield was observed in systemically infected plants.

12. Agrawal, V.K., Nene, Y.L. and Beniwal, S.P.S. 1977. Detection of bean common mosaic virus in uridbean (P. mungo) seeds. Seed Science & Technology, 5:619-625.

BCMV was successsfully detected in P. mungo seeds by indicator inoculation, growing on and microprecipitin tests. Any one of these tests can be used to detect the virus in infected seeds.

13. Agrawal, V.K., Nene, Y.L. and Beniwal, S.P.S. 1979. Location of bean common mosaic virus in urdbean seed. Seed Science and Technology, 7: 455-458.

The virus was detected in seed coat, cotyledons and primary axis of Phaseolus mungo and was thus established in the embryo.

14. Agrawal, V.K., Nene, Y.L., Beniwal, S.P.S. and Verma, H.S. 1979. Transmission of bean common mosaic virus through urdbean (P. mungo L.) seeds. Seed Science & Technology, 7 : 103-108.

Urdbean plants infected by BCMV produced shrivilled seeds. Virus was present in seeds of all germplasm and cultivars of urdbean. Transmission ranged 2-10%. Plants producing symptoms, 5-30 days after sowing, showed 17.3% seed transmission, those from 30-40 and 40-50 days, 12.1 & 5.1%, respectively. Small seed showed a slightly higher transmission than shrivilled and bold ones. Neither dry heat nor hot water treatment had any effect on virus survival within viable seeds.

15. Ahmad, M. 1975. Screening of mungbean (Vigna radiata) and urdbean (Vigna mungo) germplasm for resistance to yellow mosaic virus. Journal of Agricultural Research Pakistan, 13: 349-354.

In studies with 123 exotic and 34 indigenous mungbean cultivars in the summer of 1972 and 1974, none was resistant and only 6 local collections showed some tolerance. However, 17 of the 96 exotic and 8 of the 26 indigenous urdbean types were highly resistant to mungbean yellow mosaic virus and 50% of the total material was fairly tolerant.

16. Ahmad, M. and Harwood, R.F. 1973. Studies on a white fly transmitted yellow mosaic of urdbean (Phaseolus mungo). Plant Disease Reporter, 57: 800-802.

The mosaic has the characteristics of a virus disease. No transmission occured by mechanical means or by dodder but grafting and white fly from infected fields yielded symptoms; no transovarian carry over was demonstrated. The same agent also affects mungbean. Partial resistance was found in urdbean lines that could be incorporated into susceptible varieties with otherwise desirable characteristics.

17. Ahmad, Q.A. 1949. Varietal resistance and susceptibility of Phaseolus radiatus towards Cercospora. Science & Culture, 14: 436.

Phaseolus radiatus and its varieties grandis and aurea showed infection of Cercospora, probably C. cruenta. Symptoms on hosts are described. The difference in susceptibility of these varieties was attributed to difference in number of stomata per unit leaf area and their size. The variety aurea had fewer stomata with smaller pore size and thus showed less infection.

18. Ahmad, Q. 1985. Fungicidal control of Cercospora leaf spot of mungbean (V. radiata). Indian Phytopathology 38: 418-422.

Seed treatment with Bavistin 50 WP (@ 1 g/kg seed) followed by a single spray of Bavistin 0.05% as soon as leaf spot appear, significantly reduced the disease and increased the grain yield by 3.611 q/ha, providing a net additional income of Rs.1220.46/ha. The return per rupee was Rs.3.36.

19. Ahmad, Q. 1987. Residual fungitoxicity and spray time interval of a few fungicides against Cercospora canescens. Indian Phytopathology, 40: 542-543.

Bavistin 0.05% inhibited spore germination of C. canescens on glass slide and mungbean leaf upto 15 days to an extent of 100 per cent. Afterward the effect declined. Dithane M-45 and Dithane Z-78 could give 100% inhibition upto 5 days of spray only. Results suggested that Bavistin can be sprayed at an interval of 20-25 days, Dithane M-45, Dithane Z-78 and Difolatan at 10-15 days and Blitox at 10 days for effective control.

20. Ahmad, S.R. and Gaur, R.B. 1982. Chemotherapeutic approach to check yellow mosaic virus of mung (Phaseolus aureus L.). Hindustan Antibiotics Bulletin, 24(1/2): 18-20.

A combination of aureofungin (0.003%) and Dimecron (0.25 kg a.i./ha) decreased incidence of MYMV on mung and increased yield.

21. Ahmad, H.U., Bakr, M.A., Alam, K.B. and Kaul, A.K. 1981. Diseases of major pulse crops in Bangladesh. III International Symposium Plant Pathology, I.P.S., New Delhi, 86 (Abst.).

Black gram and green gram are grown in winter as well as summer in Bangladesh. Thirteen diseases on black gram and four on mung bean were recorded of which yellow mosaic of both crops is widespread. During summer season, low incidence of yellow mosaic was observed and Cercospora leaf spot came late in both crops.

22. Ahuja, M.R. and Singh, B.V. 1977. Induced genetic variability in mungbean through interspecific hybridization. Indian Journal of Genetics and Plant Breeding, 37: 133-136.

Through a systemic programme of interspecific hybridization between YMV susceptible variety of P. aureus (Hyb. 45, T-44 and Pusa Baisakhi) and P. sublobatus (resistant to YMV), plant materials have been produced in mungbean which not only showed resistance to YMV but also exhibited enormous genetic variability with respect to yield components and plant type.

23. Alam, S.S., Qureshi, S.H. and Bashir, M. 1985. A report on web blight of mungbean in Pakistan. Pakistan Journal of Botany, 17: 165.

The disease of Vigna radiata caused by Rhizoctonia solani is newly reported from Pakistan.

24. Allen, D.J. 1979. New disease records from grain legumes. FAO Plant Protection Bulletin, 27: 134-136.

Among these records from tropical Africa on various crops including pigeonpea, Lablab purpureus, limabean (P. lunatus), Psophocarpus tetragonolobus, Vigna radiata, cowpea and soybean was Peronospora manchurica on soybean in Ethiopia.

25. Amin, K.S., Baldev, B. and Williams, F.J. 1978. Transmission of leaf crinkle virus of urdbean by vacuum infusion of extract into water soaked seeds. Current Research, No.6: 98-99.

Seed inoculation did not affect germination in Phaseolus mungo and 40% of seedlings from inoculated seeds showed typical symptoms after 6 weeks.

26. Amin, K.S. and Singh, R.A. 1987. Diseases of mung, urid and pea and their control. In Plant protection in field crops, edited M. Veerbhadra Rao and S. Sithanantham. Plant Protection Association of India, pp. 203-217.

Fungal and bacterial diseases of mung and urdbean are described. Viral diseases include yellow mosaic, leaf crinkle, mosaic mottle and leaf curl. Amongst fungal diseases Cercospora leaf spot, powdery mildew, anthracnose, Macrophomina blight, root rot and leaf blight & rust are described. Bacterial leaf spot is also described. The symptoms, host range, yield losses and control of different diseases have been given.

27. Amin, P.W., Ghanekar, A.M., Rajeswari, R. and Reddy, D.V.R. 1985. Tomato spotted wilt virus as the causal pathogen of leaf curl of mung bean, Vigna radiata (L.) Wilczek. and urdbean, Vigna mungo (L.) Hepper in Andhra Pradesh, India. Indian Journal of Plant Protection, 13: 9-13.

Leaf curl disease of mungbean and urdbean is found to be caused by tomato spotted wilt virus (TSWV) based on its low thermal in-activation point (45-50°C) transmission by thrips (Frankliniella schultzei) positive reaction with TSWV antiserum, characteristic lesions on cowpea and typical symptoms on a wide range of host plant.

28. Amusingh, S. 1984. Ampelomyces quisqualisces on black gram. FAO Plant Protection Bulletin, 32: 144.

This hyperparasite is newly reported on Oidium sp. on P. mungo at Chandel India and the possibility will be explored of its application as a biocontrol agent.

29. Anahosur, K.H., Fazalnoor, K. and Narayanaswamy, B.C. 1972. A new leaf spot disease of Salvia leucantha Cav. from India. Sydowia, 25: 143-146.

Corynespora cassicola was isolated from diseased plants. It was pathogenic to cowpea, Phaseolus mungo and soybean.

30. Anderson, T.R. 1985. Root rot and wilt of mungbean in Ontario. Canadian Plant Disease Survey, 65:3-5.

This disease caused severe losses in a seed increase field of Vigna radiata and a nursery in 1979 and 1980. Root rot was prevalent during that early growing season on clay soil. Wilt occurred during the flowering and late pod filling stages on clay and sandy soil. Rhizoctonia solani, Thielaviopsis basicola, Fusarium oxysporum and a Fusarium sp. were isolated from diseased plants. In Pathogenicity tests in the glasshouse R. solani and T. basicola caused distinct lesions on roots and lower stem similar to those observed in the field. F. oxysporum and Fusarium sp. were nonpathogenic.

31. Anonymous, 1923. Thirty sixth Annual Report. South Carolina Experimental Station: 46-48.

Two new diseases encountered in 1922 are under observation, namely a bacterial affection of English peas, which is stated to be causing severe damage and a disease of mungbeans.

32. Anonymous, 1945. Report of Imperial Council of Agricultural Research, Delhi, 1944-45, pp.1-11.

Yellow mosaic of P. aureus was reported as a new disease .

33. Anonymous, 1952. Report of the Division of Mycology and Plant Pathology, 1952. Scientific Report Agriculture Research Institute , New Delhi 1949-50 : 81-82.

The virus responsible for mosaic of P. mungo lost its infectivity after 10 minutes exposure to temperature of 60°C and was inactivated at a dilution of 1:2000 as well as by treatment with 50% alcohol, 0.5% $CuSO_4$ or $HgCl_2$ and 5% carbolic acid. It remained infective for 26 hours at 15-37°C.

34. Anonymous, 1957. Annual Report , Department of Agriculture Kenya, 1955, II: 237.

Phaseolus aureus was attacked by Elsinoe phaseoli.

35. Anonymous, 1960. Work of I.R.C.T. 1957-1960. Cotton et Fibr. trop. 14(2): 83-321.

At Bambari new pathogens were reported- Colletotrichum curvatum on Crotalaria mejussi, Xanthomonas phaseoli and C. lindemuthianum on leaves and stems of Phaseolus aureus.

36. Anonymous, 1962. Report of Indian Agricultural Research Institute, New Delhi 1962. 2: 147-159.

Bean mosaic virus was transmitted to P. mungo and P. aureus from P. vulgaris.

37. Anonymous, 1964. Division of Plant Industry, Science Branch, Plant Pathology Section Report 1963-64: 24-25.

Powdery mildew was found on mungbean which is reported to be imperfect state of Sphaerotheca fuligena.

38. Anonymous, 1965. Plant disease survey for the year ending 30th June 1964. 34th Annual Report New South Wales, Department of Agriculture, Division of Science Services, Biology Branch, pp. 38.

Besides records of other plant diseases Phyllosticta sp. was reported on P. aureus.

39. Anonymous, 1965. New plant diseases. Agril. Gaz. New South Wales, 76(1): 38-41.

Diseases newly reported from N.S.W. during 1964 include Ascochyta phaseolorum and Macrophomina phaseoli on P. aureus.

40. Anonymous, 1975. Green gram enemies. Farmer and Parliament 10(9):8.

Important diseases of mungbean have been described in brief and their control measures are given.

41. Anonymous, 1984. Mungbean Pathology. Progress Report AVRDC, Taiwan: 193-199.

Screening of V. radiata against CMV & to 3 unknown virus isolates is reported. Further studies to identify these three isolates and glasshouse seedling screening for resistance to powdery mildew (E. polygoni) is included.

42. Anonymous, 1984. Progress Report AICRP on Nematodes, IARI, New Delhi pp.24.

Mungbean lines ML 3, ML 62 and PIM 141 were resistant to Meloidogyne incognita and ML 50 to M. javanica.

43. Arjunan, G., Vidyasekaran, P. and Kolandaisamy, S. 1976. How to combat diseases of green gram. Farmer and Parliament 11(2): 17-18.

Important viral & fungal diseases of mungbean have been described giving their symptoms, losses and control.

44. Arora, Y.K. and Bajaj, K.L. 1977. Effect of ethrol on the phenolics of mung (P. aureus) infected by Rhizoctonia solani. Acta Phytopathologica Academiae Scientiarum Hungaricae 12, 269-271.

Treatment of infected hypocotyles of P. aureus with 50 ppm ethrol resulted in a two fold increase in the total phenolic content.

45. Arora, Y.K. and Bajaj, K.L. 1978. Phenolic changes in mung (P. aureus) infected by Rhizoctonia solani. Acta Phytopathologica Academiae Scientiarum Hungaricae 13: 337-341.

Healthy tissues of mungbean contained larger quantity of total phenolics than those inoculated with R. Solani. Inoculation favoured the formation of new phenols and two new substances appeared while one substance disappeared after 24 hours.

46. Arora, Y.K. and Bajaj, K.L. 1978. Effect of vitavax on the polyphenolic constituents of mung infected by Rhizoctonia solani. Plant Biochemical Journal, 5:97-100.

A change in the pattern of polyphenolics constituents of the hypocotyls of infected mung was observed after treatment with vitavax (carboxin). The increase in phenolic compounds suggests their role in disease resistance.

47. Arora, Y.K. and Bajaj, K.L. 1985. Peroxidase and polyphenol oxidase associated with induced resistance of mungbean to Rhizoctonia solani Kuhn. Phytopathologische Zeitschrift, 114: 325-331.

In hypocotyl of V. radiata infected with R. solani peroxidase activity was higher than that of controls at 24 hrs. after inoculation, lower at 48 and 72 hrs then higher again at 120 hrs. Polyphenol-oxidase activity increased after inoculation compared with controls. Increases were correlated with the appearance of disease symptoms. Treatment with ethephon, an ethyline releasing compound, increased resistance to R. solani and enhanced peroxidase (PPO) activity. The peroxidase isoenzyme pattern was found to change as a result of inoculation and ethephon treatment.

48. Arya, H.C. 1959. On the occurrence of physiological strains in Myrothecium roridum. Indian Phytopathology 12: 164-167.

M. roridum from 8 hosts including P. radiatus were not host specific but differed on degree of infection.

49. Ashraful Islam, MD. 1977. Mungbean cultivation in Bangladesh. I International Mungbean Symposium, AVRDC, Taiwan: 21-23.

Major diseases of mungbean are C. canescens, C. cruenta, E. polygoni and root rot (Fusarium solani). To control diseases, spray 2-3 times with DM-45 (5 lbs/ha) or copper oxychloride (7-9 lbs/ha) at 15 days interval is recommended.

50. Atheya, S.C. 1977. A mosaic disease of Urid from Kanpur, India. Indian Journal of Mycology & Plant Pathology, 7 : 99-100.

During September 1968, a severe mosaic disease was observed in experimental plot of urid variety T 27at the University Farm, Kanpur. Association of Aphis craccivora was noted. Symptoms, physical properties, transmission and host range described.

Natarajaratnam, N.

51. Babu, R.C., Rathinaswamy, R., Srinivasan, P.S./and Sreerangaswamy, S.R. 1984. Certain physiological changes in green gram plants infected by mungbean yellow mosaic virus. Madras Agricultural Journal, 71:795-798.

Infection of Vigna radiata plants by MYMV caused significant reduction in number of pods per plant, seed yield and 100-seed weight; when healthy and infected leaves were compared, a reduction in the content of chlorophyll and functional chloroplast cells was evident in the latter. Soluble N and reducing sugars accumulated to a greater extent in infected leaves and the rate of photosynthesis was reduced.

52. Baghel, R.K.S., Kotasthane, S.R., Khare, M.N. and Gupta, Om. 1985. Efficacy of seven methods in the detection of three Fusarium species associated with moong seeds. Indian Journal of Mycology and Plant Pathology, 15: 313-314.

The highest content of F. moniliforme from seeds of mungbean were detected by agar plate method & F. semitectum (F. pallidoroseum) by the standard blotter method. No technique was efficient against F. solani.

53. Bansal, R.T., Khatri, H.L., Sharma, O.P. and Singh, I.P. 1984. Epidemiological studies on viral disease of mung and mash in Punjab. Journal of Research, Punjab Agricultural University, 21: 54-58.

A survey of mung and mash showed the ULCV & MYMV were fairly common. ULCV was more common on Urid than on mungbean.

54. Barman, B., Hyder, A. and Roy, A.K. 1976. Leaf blight of green gram caused by Curvularia eragrostidis. Current Science, 45: 468.

A leaf blight of green gram affecting the tips, caused by C. eragrostidis was observed on 11 cultivars of green gram in varietal trial at Assam. Phaseolus aureus is a new host.

55. Baruah, P. and Lal, S. 1981. Host range of Rhizoctonia solani f. sp. sasakii, the incitant of banded sclerotial disease of maize. Indian Phytopathology, 34: 494-496.

Of 20 plant spp. tested, 10 were found susceptible hosts including V. radiata. Symptoms on these hosts are described.

56. Bashir, M., Alam, S.S., Qureshi, S. and Malik, B.A. 1985. Control of mungbean anthracnose by foliar fungicides. Pakistan Journal of Agricultural Research, 6: 173-175.

Good control of Colletotrichum lindemuthianum on 6601 and M 19-19 mungbeans was given by benlate (benomyl), daconil (chlorothalonil) and Tecto-60 (thiabendazole) in a field trial in 1983, with reductions in disease severety on leaves, stems and pods and improved seed yield. The yield of 6601 was increased by 79.07% with benomyl treatment.

57. Behniwal, M.S. and Parashar, R.D. 1979. Studies on bacterial leafspot of mung (Vigna radiata L.). Geobios, 6: 26-27.

The optimum population level for development of disease in V. radiata inoculated with the mung strain of X. phaseoli were determined with inoculum of 3.5×10^3 cells/ml. Lesions developed only when an abrasive was used. The strain was severe on Frenchbean & Dolichos lablab equal to V. radiata. Pathogen was moderately aggressive on broadbean and weakly on limabean while urid, cowpea, soybean, pigeonpea and runner bean were immune.

58. Behniwal, M.S. and Parashar, R.D. 1981. Evaluation of antibiotics and fungicides for the control of bacterial leaf spot of mung. Haryana Agricultural University Journal of Research, 11: 36-39.

Only chloramphenicol of 8 antibiotics and vitavax of 12 fungicides tested, in vitro, showed maximum inhibition of Xanthomonas (campestris pv.) phaseoli from Vigna radiata. The results in vivo were unlike those obtained in vitro.

59. Benigno, D.R.A. 1979. Occurrence of a witches broom disease of mungbean in the Philippines. Philippine Phytopathology, 15: 86.

A disease of Vigna radiata observed during a survey in the northern provinces in August 1977 is described. It may be caused by a mycoplasma like organism which is leafhopper transmitted.

60. Benigno, D.R.A. 1979. Note: an aphid-borne virus isolated from blackgram in the Philippines. Philippine Agriculturist, 62: 328-332.

The flexuous rod virus, similar in properties to bean common mosaic virus and isolated from Phaseolus mungo was mechanically transmitted by Aphis craccivora, A. gossypii

and Rhopalosiphium maidis. Thermal inactivation point was 60-70°C, dilution end point 10^{-3}-10^{-4} and longevity in vitro 3 days. It systemically infected V. mungo, V. radiata and cowpea and induced chlorotic local lesions, often followed by systemic vein yellowing in Chenopodium amaranticolor and C. quinoa. It did not infect Datura stramonium, Gomphrena globosa, Nicotiana glutinosa, N. rustica, Xanthi tobacco, broad bean or Zinnia.

61. Benigno, D.R.A. and Favali Hedayat, M.A. 1977. Investigations on previously unreported or noteworthy plant viruses and virus diseases in the Philippines. FAO Plant Protection Bulletin, 25(2):78-84.

Of the seven viruses described, mungbean mosaic (yellow) was possibly transmitted by white fly.

62. Benigno, D.R.A. and Dolores, A.C. 1977. Virus diseases of mungbean in the Philippines. Proceedings First International mungbean Symposium, AVRDC, Taiwan:173-175.

Eleven mungbean diseases have been reported in the Philippines, six fungal, three due to nematodes and two by viruses. Work on four virus diseases- yellow mosaic, green mosaic, leaf curl browning and little leaf is reported.

63. Beniwal, S.P.S. and Bharathan, N. 1980. Beetle transmission of urdbean leaf crinkle virus. Indian Phytopathology, 33: 600-601.

Pantnagar isolate of ULCV was transmitted to urd by Henosepilachna dodecastigma. It was not transmitted by Aphis craccivora, Circulifer tenellus, A. gossypii & B. tabaci previously reported as vector.

64. Beniwal, S.P.S., Bharathan, N. and Chaubey, S.N.1983. Two cucurbitous hosts of urdbean leaf crinkle virus. Indian Phytopathology, 35 : 577-579.

ULCV from V. mungo was found to induce severe symptoms of stunting and leaf malformation in the cucumber cv. National Pickeling and a local cultivar of Lagenaria cylindrica.

65. Beniwal, S.P.S. and Chaubey, S.N. 1979. Transmission of urdbean strain of bean common mosaic virus (UB-BCMV) by a tarsonemid mite, Polyphagotarsonemus latus. Indian Phytopathology, 32: 163(Abstract).

Mosaic mottle caused by UB-BCMV infected plants showed association of tarsonemid mite in glasshouse. Mites from diseased plants could cause disease in healthy plants of var. UPU 1. This is the first record of tarsmnemid mite transmitting a plant virus.

66. Beniwal, S.P.S. and Chaubey, S.N. 1979. Urdbean leaf crinkle virus : Effect on yield contributing factors, total yield and seed characters of urdbean. Seed Research, 7: 175-181.

Infection by ULCV significantly reduced number of pods per plant, seeds/pod in urd Pant U 30, Pant U-26 but 1000 seed weight was unaffected. In both varieties yields reduced maximum (70.7 & 83.8% respectively) in plants infected 10 days after sowing. Late infections reduced the losses progressively upto 60 days after planting (18.0 & 13.2% losses, respectively). Infection by ULCV resulted in shrivilled and light brown coloured seeds, early infected plants producing maximum seed discolouration. Virus caused production of oversize seeds though the average seed size & emergence remained unaffected.

67. Beniwal, S.P.S. and Chaubey, S.N. 1984. Detection of urdbean leaf crinkle virus in urdbean seed. Seed Research, 12: 101-104.

Three methods are described for detection of ULCV in V. mungo seeds. The dry examination method serves as a good indication of the presence of virus if over size seeds are found in the seed lot and infection can be confirmed by growing on and indicator inoculation tests.

68. Beniwal, S.P.S. and Chaubey, S.N. 1984. Internal seed borne nature of urdbean leaf crinkle virus in urdbean seed. Seed Research, 12: 6-10.

ULCV was detected in the seed coat, cotyledons and primary axis of V. mungo.

69. Beniwal, S.P.S., Chaubey, S.N. and Matheswaran, C. 1983 . Some factors affecting transmission of urdbean leaf crankle virus through seeds of urdbean (Vigna mungo (L.) Hepper). Seed Research, 11:95-99.

Seed transmission was 0-15% in different germplasm and varieties. Plant age at infection affected seed transmission. A higher percentage occurred in early than in later infected plants. Seed transmission was not affected by morphological abnormalities in seed, different stages of seed maturation and presence or absence of seed coat. Heat treatment affected transmission in seed from affected plants as none occurred in seed receiving hot water treatment at 60°C for 10, 20 and 30 min. and 70°C for 10 & 20 min. or dry heat treatment at 70°C for 10, 20 & 30 min.

70. Beniwal, S.P.S., Chaubey, S.N. and Bharathan, N. 1980. Presence of urdbean leaf crinkle virus in seeds of mungbean germplasm. Indian Phytopathology, 33:360-361.

Out of 49 mung germplasm, 3 exhibited presence of ULCV in seed by grow on tests i.e. culture 1, S 9 and PIMS 3. The rate of seed transmission was 6, 10 & 15% respectively. In mungbean, bean common mosaic virus , mungbean mosaic virus & cucumber mosaic virus have also been reported as seed borne previously.

71. Beniwal, S.P.S., Kolte, S.J. and Nene, Y.L. 19[illegible]. Nature and rate of spread of urdbean leaf crinkle disease under field conditions. Indian Journal of Mycology and Plant Pathology, 9: 188-192.

The low incidence (2.75%) of urdbean leaf crinkle virus indicated a very low rate of disease spread. Most disease in the field seemed to develop from infected seed although rubbing together diseased and healthy leaves may also spread the virus, particularly late in the season.

72. Beniwal, S.P.S., Saxena, G.C. and Tripathi, H.S.1983. Natural occurrence of anthracnose of mungbean caused by Colletotrichum capsici. Indian Journal of Mycology and Plant Pathology, 13: 356-357.

The disease occurred on V. radiata cultivars T 44 & Jawahar 45 in the field.

73. Beniwal, S.P.S. and Tripathi, H.S. 1979. Leaf spot of urdbean caused by Fusarium equiseti (Corda) Sacc. Tropical Grain Legume Bulletin No.16: 15-16.

This pathogen was isolated from the Vigna mungo cv. Pant U 19 with small brown leaf spots which increased to 2-3 mm diam. and had grey centres and dark brown margins. Pathogenicity was confirmed on 8 day old seedlings. This is the 1st report of F. equiseti causing leaf spot in V. mungo.

74. Beniwal, S.P.S., Vohra, K. and Verma, H.C. 1980. Effect of mungbean yellow mosaic virus infection at different stages of plant growth on the aminoacid composition of urdbean (Vigna mungo L.) seeds. Indian Journal of Experimental Biology, 18: 302-303.

Infections 10 or 30 days after planting resulted in considerable increase in total aminoacids. Seeds from plants infected at 50 days showed a decrease and those at 70 days no effect. Of the 15 aminoacids detected, 9 were increased, 4 decreased and 2 remained unchanged in seeds from infected plants.

75. Beyries, A. [illegible]. Effectiveness of some systemic fungicides against Rhizoctonia solani and treatment of bean and radish. Phytiatrie-Phytopharmacie, [illegible]: [illegible]-116.

Five systemic fungicides were compared with the non-systemic pentachloronitrobenzene (quintozene) in the laboratory screening and field tests against R. solani on bean, P. mungo and radish. Seed treatment and soil treatment methods were used. [illegible] was the best. In view of its low toxicity (LD 50, 3200 mg/kg) it could be used in market gardening.

76. Beyries, A. and Messiaen, C.M. 1969. Virulence and specificity of some strains of Corticium solani in relation to market crops. Annls Phytopathologie, 1(1): 37-44.

A classification of 30 strains of C. solani from South France into five groups, based on virulence on various hosts including P. mungo and on temperature requirements is given.

77. Bhaktavatsalam, G. and Beniwal, S.P.S. 1977. Note on auxin content in urdbean (Phaseolus mungo L.) infected with mungbean yellow mosaic virus. Pantnagar Journal of Research, [illegible]:[illegible].

Auxins in both healthy and MYMV infected urdbean plants were assayed by thin layer chromatography. A decrease in auxin content in MYMV infected leaves was observed at all three leaf stages which could possibly explain reduction in leaf size and overall stunting of urdbean plants due to infection.

78. Bhagwat, V.Y. and Pandey, R.S. 1982. Aerobiological studies over black gram field at Nanded. Indian Botanical Reporter 1: [illegible].

79. Bhaktavatsalam, G., Nene, Y.L. and Beniwal, S.P.S. 1981. [illegible] in urdbean leaf infected by urdbean leaf crinkle virus. Indian Phytopathology, [illegible].

In infected leaves the tryptophan [illegible] in all stages of leaves while IAA [illegible] increased to a considerable extent. Reduced tryptophan might be due to its use for formation of IAA which was found increased.

80. Bhaktavatsalam, G., Nene, Y.L. and Beniwal, S.P.S. 1983. Ultrastructural changes in urdbean leaves infected by urdbean leaf crinkle virus. Indian Phytopathology, 36: 128-131.

Virus like particles (VLP) were observed in infected urdbean leaves in the [illegible] cytoplasm and chloroplasts but not in cells of healthy leaves. The VLP were spherical, diam. 25-30 nm. Hypertrophy of infected cells was observed. Some mitochondria were different as compared with normal spherical ones in healthy cells.

81. Bhaktavatsalam, G., Nene, Y.L. and Beniwal, S.P.S. 1983. Influence of certain physico-chemical factors on the infectivity and stability of urdbean leaf crinkle virus. Indian Phytopathology, [illegible].

Influence of pH, [illegible] on infectivity of virus is given. Max. infectivity was at pH 7.0. Thermal inactivation point was [illegible]. [illegible] loss in infectivity was fast at 7.0 pH as compared to 7.1. Calcium tribasic & dibasic [illegible] & EDTA completely inhibited virus infectivity whereas Magnesium sulphate had no effect on it. Actinomycin D & cycloheximide increased infectivity whereas tetracycline hydrochloride did not affect it. Phenol treatment reduced infectivity suggesting that it is not a viroid. [illegible] does not possess lipids. Addition of [illegible] mercapto-ethanol or [illegible] increased infectivity & longevity.

82. Bhardwaj, C.L., Paul, Y.S. and Singh, B.M. 1985. Some new leguminous hosts of powdery mildew. Indian Journal of Mycology & Plant Pathology, 15: 292.

The conidial stage of Sphaerotheca fuligina was found on glasshouse grown plants of legumes including Vigna radiata & V. mungo.

83. Bhardwaj, C.L. and Singh, B.M. 1986. Strain variation in Colletotrichum dematium f. sp. truncatum from four leguminous hosts. Indian Journal of Mycology & Plant Pathology, 16: 139-141.

Isolates of Colletotrichum dematium f. sp. truncatum from mungbean, urdbean, horsegram and soybean were compared. On mungbean and urdbean symptoms appeared as small spots later assuming horse shoe shape. All the four isolates differed from each other on the basis of cultural characters, morphology and pathogenicity.

84. Bhardwaj, C.L. and Singh, B.M. 1984. Host range of oidium state of Erysiphe pisi from peas on some leguminous hosts in Kangra valley of Himachal Pradesh. Indian Phytopathology, 37: 732-733.

Under natural condition the Oidium state of powdery mildew on several leguminous hosts including V. mungo & V. radiata resembled E. pisi which was found to have a very wide host range in Kangra valley.

85. Bhardwaj, S.V. 1981. Some factors affecting transmission of urdbean (Vigna radiata var. mungo) leaf crinkle virus by aphids. III International Symposium of Plant Pathology, IPS, New Delhi:165 (Abst).

Single Aphis craccivora Koch & Acyrthosiphon pisum Harris could transmit the ULCV. Best transmission was when they were mixed in ratio of 1:4 & when they were prefasted 1½ hrs & given virus acquisition of 20 & 10 minutes, respectively followed by post virus acquisition fasting for 10 minutes. They lost their

viruliferous nature rapidly while feeding than while fasting. Similarly, temperature, nutritional status of test plants, inoculation feeding period also influenced degree of transmission positively.

86. Bhardwaj, S.V. and Dubey, G.S. 1986. Studies on the relationship of urdbean leaf crinkle virus and its vectors. Aphis craccivora and Acyrthosiphon pisum. Journal of Phytopathology, 115: 83-88.

Pre-acquisition fasting of both aphid spp. of 90 min. and post-acquisition fasting of 20 min. (A. craccivora) and 80 min. (A. pisum) enhanced virus transmission to Vigna mungo plants more than other periods of fasting examined. Although urdbean leaf crinkle virus could be acquired by both aphid spp. after feeding for 1 min, transmission was greatest after 20 min. (A. craccivora) and 10 min. (A. pisum) acquisition access. Longer access periods led to a decrease in transmission considered possibly due to inhibitor (Saliva) production. Both aphid spp. transmitted the virus in probes lasting 1 min, the opt. being 1-5 min. (A. craccivora) and 10-20 min. (A. pisum). However, beyond 5 min of successive transfer on test plants, loss in transmisibility was apparent. The virus was non persistantly borne in the aphids, which retained it for only 30 min. (A. craccivora) and 60 min. (A. pisum) on maize (a non host of ULCV), but for atleast 320 min. when fasting.

87. Bhardwaj, S.V., Dubey, G.S. and Sharma, I. 1982. Effect of benlate on infection and transmission of urdbean (Vigna radiata var. mungo) leaf crinkle virus. Phytopathlogische Zeitschrift, 105: 87-91.

Drenching V. radiata plants with benlate (benomyl) at 1% or more before inoculation, mechanically or by Aphis craccivora and Acyrthosiphon pisum, prevented symptom development. At lower conc. transmission was reduced. Post inoculation drenching was less effective. The aphids failed to acquire the virus from infected plants drenched with 2% or more of the fungicide.

88. Bhargava, S.N. 1965. Studies on the charcoal rot of potato. Phytopathologische Zeitschrift, 53: 35-44.

The potato isolate of Macrophomina phaseolina was pathogenic on P. aureus and P. mungo var. radiatus.

89. Bhargava, S.N. and Shukla, C.N. 1978. Pod rot of P. mungo & P. aureus. Acta Botanica Indica, 6(Suppl.) :192-193.

90. Bhargava, S.N., Shukla, D.N. and Singh, N. 1979. Correlation between the number of root nodules and incidence of root rot & wilt diseases of pulses. Proceedings National Academy of Sciences, India, B. 49: 56.

Plants with numerous nodules collected in the Allahabad area had less or no infection by root rot and wilt pathogen (Fusarium spp.). Plants of P. aureus & P. mungo inoculated with Rhizobium alone remained healthy of those with Rhizobium + pathogen 20-30% were infected and with pathogen alone 90% were infected.

91. Bhargwa, S.N. and Shukla, D.N. 1979. Inter-relationship studies on some pulses and oil crop seeds with their seed borne fungi. Proceedings National Academy of Sciences, India, B, 49: 81-84.

Seedcoat leachates & seed extracts of urd, mung & sesame decreased spore germination of F. oxysporum, F. solani & Curvularia lunata. Culture filtrate of these fungi inhibited seed germination of these plants.

92. Bharthan, N. and Beniwal, S.P.S. 1984. Transmission characteristics of urdbean leaf crinkle virus by epilachna beetle, Henosepilachna doddecastigma. Indian Phytopathology. 37: 660-664.

The adult of beetle, required an optimum of 24 hrs. acquisition and 48 hrs inoculation access periods for transmitting ULCV. A single adult could transmit the ULCV through a group of 5 was required for 100% transmission. Preacquisition fasting had no effect.

. Grubs were less efficient than adults. It could detain virus for 9 days. Virus was not detectable in outer parts but in the faeces of viruliferous adult beetle.

93. Bhaskaran, R. and Padmanabhan, P. 1978. Changes in total phenols and sugars in mung and urdbean due to infection by powdary mildew fungus. Food farming and Agriculture, 10(6): 232-233.

Total phenols are more in infected than in healthy leaves of both crops. Sugar decreased in severely infected urd leaves . In mun bean decrease in sugar was correlated with the disease severity.

94. Bhaskara Rao, P. and Mallaiah, K.V. 1985. Factors affecting germination of Cercospora canescens pathogenic to black gram. Indian Phytopathology, 38:559-560.

Conidia germinated 100% in 8 hrs.; opt. temperature was 25°C. It was higher in free water than 100% RH; white light favoured it while red light inhibited. pH 5.0-7.0 was favourable. Darkness inhibited germtube elongation.

95. Bhaskara Rao, P. and Mallaiah, K.V. 1988. Factors affecting sporulation of Cercospora canescens pathogenic to blackgram. Indian Phytopathology, 41: 280 (Abst.)

The number of conidia of C. canescens produced per cm^2 of black gram leaf area increased rapidly upto 7 days and then the increase was very slow. Sporulation occurred at temperatures between 15° and 40°C with optimum at 25°C. No sporulation was observed below 81% RH. Increase in RH above 81% increased conidial number as well as length & septation of conidia. Conidial production was favoured by complete darkness.

96. Bhate, S.B., Utikar, P.G. and Shinde, P.A. 1985. Chemical control of damping off of mung. Journal of Maharashtra Agricultural University, 10:

M. phaseolina on Vigna radiata was effectively controlled by benlate, captan, DZ-78 and DM-45. Two sprays at 10 & 20 days after sowing were sufficient to maintain a healthy seedling population more than 90%.

97. Bhate, S.B., Utikar, P.G. and Shinde, P.A. 1985. Reaction of mungbean varieties to damping-off and root rot. Journal of Maharashtra Agricultural University, 10: 230.

Of 24 cultivars of Vigna radiata tested in a plot infested with M. phaseolina, 12 were moderately resistant, 11 moderately susceptible and 1 highly susceptible.

98. Bhikane, N.S. and Mukadam, S. 1982. Impact of different conditions on the incidence of seed mycoflora of urid bean (phaseolus mungo L.). Indian Botanical Reporter, 1: 55-57.

The seed mycoflora of P. mungo variety Sindkheda from different store houses and field showed variation in species content and intensity of fungal attack. The results are tabulated. Medium, pH and temp. considerably influenced isolations. Rose Bengal agar favoured isolation of M. phaseolina while D-5 favoured Fusarium spp.

99. Bilgrami, K.S., Prasad, T., Jamaluddin and Roy, A.K. 1976. Studies on the deterioration of some pulses by fungi. Indian Phytopathology, 29: 374-378.

Of the many fungi associated with seeds of Phaseolus aureus and P. mungo in storage Aspergillus flavus predominated.

100. Bilgrami, K.S., Sinha, R.K. and Prasad, T. 1978. Effect of fungal flora on the seed contents of mung. Indian Phytopathology, 31: 476-479.

Quantitative changes in protein, starch and reducing sugars in mung seeds (var. Pusa baisakhi), due to fungal flora was recorded. Initially, protein declined in its contents which subsequently increased

in due course of incubation. Reducing sugars increased considerably due to infection while starch showed a decreasing trend. Qualitatively glucose and fructose, two hexose sugars, were spotted which exhibited an increasing tendency throughout the incubation. Out of ten free and bound amino acids some disappeared while others either increased or decreased. Succinic acid, fumaric acid and tartaric acid were duly detected from the alcoholic fraction of the seed which showed varying degree of contentration during different incubation periods.

101. Bindra, O.S. 1971. Studies on Arthropodes in relation to plant diseases in Punjab. Paper presented at the II International Symposium on Plant Pathology, IARI, New Delhi.

Reported ULCV on urdbean in Punjab with symptoms of puckering, crinkling and curling of leaves, malformation of flowers, & reduction in flowering. Transmission through Aphis craccivora was reported.

102. Bouckaert-Urban, A.M. and Vendrig, J.C. 1982. Influence of crown gall tumor initiation enhancer on adventitious rooting. Zeitschrift fur Pflanzenshysiologic 108: 247-254.

The tumor initiation enhancer isolated from extract fractions of sunflower plants susceptible to Agrobacterium tumefaciens, strongly stimulated initiation of adventitious roots in intact Vigna radiata plants. In cuttings, root was increased only if the active compound was applied after IBA treatment.

103. Briton-Jones, H.R. and Baker, R.E.D. 1934. Notes on some other fungous diseases in Trinidad, 1933. Tropical Agriculture (Trinidad), 11: 67-68.

Reported S. rolfsii on P. aureus under natural conditions.

104. Burkholder, W.H. 1924. Varietal susceptibility among beans to the bacterial blight. Phytopathology, 14:1-7.

Mungbean was found susceptible to Phytomonas phaseoli causing blight of beans.

105. Burkholder, W.H. 1930. Bacterial diseases of the bean. Cornell Agriculture Experiment Station, Memoir, 127: 1-88.

Described X. phaseoli on bean & tested its pathogenicity (virulence) on mungbean.

106. Bustrillos, A.D. 1965. Purification, serology and electron microscopy of Pea enation mosaic virus. Diss. Abstr. 25 (11): 6145-6146.

Isolates from Michigan, Washington, Oregon and New York were able to infect only leguminous plants, of which mungbean is a previously unreported host. Details are given of purification technique and properties of the virus.

107. Butler, E.J. 1918. Fungi and diseases in plants. Thacker Spink & Co., Calcutta pp. 547

Detailed description of diseases of crops including black gram and green gram is given.

108. Camporota, P, 1982. Research on the ecology of parasitic fungi in the soil, XVII, Measurement of the infectious potential of soils and substrates infested by Rhizoctonia solani Kuhn, causal agent of seedling damping off. Agronomie, 2: 437-442.

In the technique described soil is dried, crushed, sifted, amended with buckwheat meal and placed around the collars of mung seedlings produced in plastic containers under standardized conditions. After adjusting the soil moisture content, containers are placed in growth chambers under conducive temp. & illumination to infection. After 8 days a disease index is calculated. To quantify the infectivity of

a soil, it is assayed after dilution with different quantities of sterilized glasshouse soil. The linear regression of disease index against log soil conc. is calculated & soil concentration with disease index 50 (UPI 50/g) obtained.

108. Capoor, S.P. and Varma, P.M. 1948. Yellow mosaic of Phaseolus lunatus L. Current Science, 17: 152-153.

A new virus, double bean yellow mosaic virus, is reported on P. lunatus. P. aureus was also infected in the host range studies.

110. Castillo, M.B. 1971. Reniform nematode, Rotylenchulus sp. in mungo, soybean and peanut soils at the UPCA Central Experiment Station. Philippine Phytopathology, 7: 61-67.

Reported root rot or decay of mungbean caused by Rotylenchulus sp.

111. Castillo, M.B. 1974. Host index of plant parasitic nematodes in the Philippines. UPLB Tech. Bull., 33.

Mungbean was found susceptible to root knot nematodes, Meloidogyne spp. under controlled conditions in Philippines.

112. Castillo, M.B. 1975. Plant parasitic nematodes associated with mungbean, soybean and peanut in the Philipplines. Philippines Agriculturist, 59(3-4):91-99.

Reported root knot nematodes on mungbean in the Philippines particularly Meloidogyne spp. infecting roots and reducing yield.

113. Castillo, M.B. 1976. Effect of flooding on pot population of Rotylenchulus reniformis and Meloidogyne incognita. Philippine Phytopathology, 12:

Significant reduction in population of R. reniformis on mungbean was observed due to flooding for 1,4 & 7 days in pot experiment.

114. Castillo, M.B. 1976. Nematodes in cropping patterns. II-control of Meloidogyne incognita through cropping patterns and cultural practices. Philippine Agriculturist , 59: 295-312.

At least 2 successive croppings of corn, Tagetis erecta tomato with T.erecta or C.juncea intercrop or tomato with application of chicken dung or rice straw compost or three clean fallow periods reduced population of M.incognita .

115. Castillo , M.B. 1976. Nematode in cropping pattern. IV. population of plant parasitic nematodes associated with cropping patterns under different rice growing environments in Maneog Pangasinan. Philippine Phytopathology, 12:

In upland areas mixed population of Rotylenchulus sp. and Meloidogyne sp. were encountered in almost any field where mungbean was grown and heavy root infections were frequently associated with crop decline. In low land rice areas nematodes counts obtained indicated that flooding controlled the population of both genera.

116. Castillo, M.B. 1976. Nematodes in cropping patterns. V. Population of plant parasitic nematodes associated with different land forms and cropping patterns in a rainfed rice area in Iloil. Philippine Phytopathology 12:

In upland areas where mungbean was grown, population of Meloidogyne sp. and Rotylenchulus sp. was found with heavy root infection while in low land areas population was less.

117. Castillo, M.B. 1977. Nematodes in cropping patterns III. Composition and population of plant parasitic nematodes in selected cropping patterns in Batangas. Philippine Agriculturist, 60: 285-292.

The density levels of R. reniformis and M. acrita at harvest of mungbean were lower in more than 50% of upland fields of farmers.

118. Castillo, M.B. 1977. Increased efficiency of determining population of Rotylenchulus reniformis & Meloidogyne acrita in soil or in both and roots through bioassay. Philippine Agriculturist, 61:

Population of R. reniformis and M. acrita were studied during two successive wet season and one dry season plantings of mungbean, soybean and cowpea. Nematode population was erratic during 2 wet season plantings. Population remained at low level in Nemacure treated check plots. Yield losses were as high as 75% in some treatments.

119. Castillo, M.B. , Alejar, M.S. and Litsinger, J.A. 1977. Pathogenic reactions and yield loss of mungbean to known population of Rotylenchulus reniformis and Meloidogyne acrita. Philippine Agriculturist, 61:12-24.

In simultaneous pot, microplotes and field experiments mungbean yield reduction were 63.9, 69.8 and 61.5%, respectively in soil infested with R. reniformis and M. acrita @ 1200 and 90 larvae/hill. In soil infested with 600 M. acrita only, yield reduction was 40.5 & 28.0% only in pots and fields. The affected plants show leaf chlorosis, stunting and death or with very less pod production. In combination with M. incognita acrita caused 2% reduction in yield of mungbean.

120. Castillo, M.B., Bajet, N.B. and Harwood, R.R. 1976. Nematode in cropping patterns I. Population of Rotylenchulus reniformis on successive monocultured crops. Philippine Agriculturist, 59:288-294.

In a well drained upland field 2 cropping of corn or sorghum or 3 clean fallow periods checked population of R. reniformis, while 3 cropping of mungbean or soybean or 2 of sweet potato favoured population build up. Carbofuran 3 G incorporated in soil before or 45 days after planting @ 1.0 and 6.0 kg a.i./ha, respectively, controlled R. reniformis on mungbean and other crops.

121. Castillo, M.B. and Litsinger, J.A. 1977. Plant parasitic nematodes of mungbean in the Philippines. First International Symposium on Mungbean, AVRDC, Taiwan: 195-200.

Five species of Meloidogyne ; M. acrita, M. arenaria, M. incognita, M. javanica and Rotylenchulus reniformis are reported pathogenic on mungbean in Philippines. Symptoms, damage to the crop, population dynamics, chemical control with carbofuran 3 G and Nemacure, role of cultural practices like cropping pattern, proper drainage and use of resistant varieties are described.

122. Catibog, C.S. and Castillo, M.B. 1975. Pathogenicity of Meloidogny javanica on mungbean (Phaseolus aureus Roxb.). Philippines Agriculturist, 59(5-6):189-195.

Reported M. javanica parasitising mungbean plants in Philippines.

123. Chamberlain, D.W. 1948. Rotation only control of stem rot. Soybean Digest, 8(10): 18.

Brown stem rot caused by Cephalosporium sp. is reported on mungbean (P. aureus).

124. Chand, J.N. 1986. Bacterial diseases of legumes and their management. Indian Journal of Mycology and Plant Pathology, 16: 1-29.

Bacterial leaf spot of mung caused by X. campestris pv. phaseoli (Smith) Dye is described & reviewed with other diseases of legumes.

125. Chand, J.N. and Verma, D.S. 1968. Occurrence of new Alternaria leaf spot of cluster bean in India. Plant Disease Reporter, 52: 145-147.

In host range studies P. aureus was found to be attacked by Alternaria sp. isolated from Cyamopsis tetragonoloba.

126. Chand, J.N. , Yadav, O.P. and Yadav, H.C. 1977. Reaction of genetic stocks of mungbean to bacterial blight (Xanthomonas phaseoli). Indian Phytopathology, 30: 565.

Out of 150 mungbean lines 15 were highly resistant and 75 resistant to bacterial blight under natural infection conditions. Under artificial inoculation none of the lines were immune. ML-8, ML-10 and Jalgaon 781 were highly resistant: ML-1, ML-2, ML-3, ML-9, yellow mung and P 70-68 were resistant.

127. Chand, P. and Verma, J.P. 1980. Some characteristics of mungbean and urdbean varieties resistant and susceptible to yellow mosaic virus, Indian Phytopathology, 33: 48-53.

Higher levels of phenol & sugars in leaves did not seem to inpart resistance. Total protein content and some free amino acids were perhaps related to it although protein pattern as determined by SDS-polyacrylamide gel electrophorasis was the same. Resistant varieties had more number of 3-4 septate hooked hairs & thicker cuticle than the susceptible varieties which has less number of straight non septate leaf hairs and thinner cuticle.

128. Chand, P. and Varma, J.P. 1983. Effect of yellow mosaic on growth components and yield of mungbean and urdbean. Haryana Agricultural University Journal of Research, 13: 98-102.

The reactions of mungbean and urdbean varieties to MYMV is reported. Height, shoot weight and yield was reduced by 38.2, 28.5 & 66.6%, respectively. 1000 seed weight was reduced by 25.7% & shape, size and appearance of pods & seeds of diseased plants were considerably distorted though germination was unaffected.

129. Chandel, K.P.S., Joshi, B.S. and Pant, K.C. 1980. Breeding mungbean (Vigna radiata Wilczek) for photo insensitivity, high yield and field resistance to yellow mosaic virus. Tropical Grain Legume Bulletin, 17/18: 29-32.

The results are presented of the performance of 4 new selections (PIMS 1-4) in 2 seasons at 5 locations. In addition to improved agronomic characters the selections have field resistance to yellow mosaic virus.

130. Chandra, G. and Mathur, S.N. 1986. Responses of Vigna mungo (L.) Hepper to treatment of bavistin: Effect of nitrogen utilizing enzymes. Pesticides, 20(4):24-26.

Spray with bavistin (0.05, 0.1 & 0.2%) did not affect activities of nitrate reductase but leaves incubated in fungicide solution showed a dose dependent fall in nitrate reductase. It was observed in case of detached nodules also. The enzyme activity increased upto 1% of bavistin but decreased at higher concentration. Bavistin like cytokinins is believed to change cell permeability, thus affecting enzyme activity.

131. Charya, M.A.S., Reddy, E.J.S. and Reddy, S.M. 1983. Interaction of seed borne fungi & Rhizobium nodulation and plant growth of mung (V. radiata). Indian Journal of Mycology and Plant Pathology, 13:223-224.

Inoculation with F. oxysporum, Phoma exigua & R. solani completely inhibited nodule formation in sterilized soil. However, P. exigua caused an improvement in nodule formation when inoculated simultaneously with Rhizobium. The reverse occurred in unsterilized soil. Nodulation was decreased when some seed dressings were used.

132. Charya, M.A.S. and Reddy, S.M. 1979. Seed Mycoflora of mung (Phaseolus aureus) in Andhra Pradesh. Maharashtra Vidnyan Mandir Patrika, 14(2):55-58.

These fungi from mung seed are listed and their effect in vitro on seed germination and seedling vigour is evaluated.

133. Charya, M.A.S. and Reddy, S.M. 1980. Effect of volatile and gaseous exudates of germinating seeds of mung (Phaseolus aureus) on spore germination of some seed borne fungi. Biological Bulletin of India, 2: 47-50.

The effects of the exudates of seeds of 2 mung cultivars on spore germination of Alternaria alternata, Curvularia lunata, Drechslera rostrata and Fusarium oxysporum are tabulated.

134. Charya, M.A.S. and Reddy, S.M. 1980. Production of lyases by Phoma exigua associated with seed rot of Vigna radiata. Indian Journal of Mycology and Plant Pathology, 10: XXIII (Abst.).

P. exigua, a seed borne fungus of V. radiata produced PL and PAL in vitro which was more in pectin supplemented media but less in seed extract. PL and PAL activity was more on 12th day when pH became alkaline. Fungicides (antracol& panoctin), phenols (catechol & gallic acid) and growth substances (GA & yeast extract) adversely affected enzyme production.

135. Charya, M.A.S. and Reddy, S.M. 1980. Production of cell wall degrading enzymes by two seed borne fungi. Current Science, 49: 557-558.

Hydrolytic enzyme production (cellulolytic, pectinolytic, amylolytic & proteolytic) by Phoma exigua & Graphium penicillioides from mung and guar is tabulated. Both were poorly cellulolytic. Both showed increasing enzyme activity throughout

incubation. The results showed that both fungi can eloborate all the hydrolytic enzymes needed to colonize seeds & P. exigua would be more successful due to its superior enzymetic potentialities.

136. Charya, M.A.S. and Reddy, S.M. 1980. Effect of humidity on seed deterioration of mung (Phaseolus aureus Roxb.) by some seed borne fungi. Maharashtra Vidnyan Mandir Patrika, 15(1): 37-40.

Healthy G-65 P. aureus seeds were treated with heavy spore suspensions of Rhizoctonia solani, Phoma exigua and Colletotrichum capsici. There was a gradual decline in ascorbic acid content with incubation time compared with untreated seed where it increased for the first 36 h before declining. The 3 fungi decreased ascorbic acid content by 31.5, 64.5 and 44.4%, respectively.

137. Charya, M.A.S. and Reddy, S.M. 1980. Ascorbic acid in germinating seeds of Phaseolus aureus Roxb. under pathogenesis. Geobios, 7: 167-168.

Healthy G-65 mung seeds were treated with heavy spore suspension of R. solani, P. exigua & Colletotrichum capsici. There was a gradual decline in ascorbic acid content with incubation time compared with untreated seed where it increased for the first 36 h before declining. The 3 fungi decreased ascorbic acid content by 31.5, 64.5 and 44.4%, respectively.

138. Charya, M.A.S. and Reddy, S.M. 1981. Deterioration of mung (Vigna radiata) seeds due to certain seed borne fungi. Indian Journal of Botany, 4: 80-82.

Infection of stored seeds by Colletotrichum capsici, R. solani, Phoma exigua and A. alternata caused a marked increase in free fatty acids and reducing sugars and a decrease in protein content. A sharp rise in total phenols decreased at a later stage of incubation.

139. Charya, M.A.S. and Reddy, S.M. 1981. Production of phosphatase and esterases in germinating mung seeds under pathogenesis. Indian Phytopathology, 34:514-515.

Alkaline as well as acidic phosphatases increased in 1st 24 hr. of germinating seeds under the influence of seed borne fungi. The increase was more in F. oxysporum than in Phoma exigua infested seeds. The phosphatase- activity decreased with increase in age being pronounced decrease 36 hr. after germination. Esterase was detected both in healthy and diseased germinating seeds.

140. Charya, M.A.S. and Reddy, S.M. 1982. Toxic effect of Fusarium oxysporum on seed germination and growth of mung (Vigna radiata). Indian Botanical Reporter, 1: 169-170.

The effect of culture filtrates from V. radiata isolates of F. oxysporum on seed germination of 15 cultivars is tabulated. Toxicity increased with age of the fungus culture.

141. Charya, M.A.S. and Reddy, S.M. 1983. Effect of phenolic compounds and fungicides on cellulase (Cx) production by two seed borne fungi. Indian Journal of Mycology and Plant Pathology, 13: 337-340.
All the phenols reduced cellulase production by Phoma exigua as well as Graphium penicillioides. Catechol WAS MOST EFFECTIVE ON FORMER. Fungicides particularly c calixin also affected cellulase production.

142. Charya, M.A.S. and Reddy, S.M. 1984. Inhibition of production of pectic enzymes of Phoma exigua , seed rot fungus of Vigna radiata. Indian Phytopathology, 37: 537-539.

All the chemicals tested reduced PME secretion by P. exigua in vitro. Maximum effect was in Antracol and panoctine. Endo PG was inhibited by yeast extract and GA while they enhanced secretion of exo-PMG & endo-PMG, respectively. Catechol inhibited endo-PAL. Antrocol, panoctine & GA inhibited exp-PAL. Endo &

exo-PL were inhibited by phenols and fungicides. Decline in vegetative growth was associated with decrease in enzyme secretion.

143. Charya, M.A.S. and Reddy, S.M. 1984. Antifungal acitivity of some fungicides against four seed borne fungi. Pesticides, 18(1):38-39.

The in vitro effects of 7 fungicides against Alternaria alternata, Curvularia lunata, Drechslera rostrata & Fusarium oxysporum from mung. Results are discussed in relation to phytotoxicity and human hazards.

144. Charya, M.A.S., Reddy, S.M. and Reddy, M.M. 1980. Evaluation of different volatile compounds against fungal decay of mung (Vigna radiata) seeds. Maharashtra Vidnyan Mandir Patrika, 15(2): 61-63.

Of 19 compounds tested, acetone, aniline and amyl alcohol effectively controlled grain spoilage due to R. solani during post harvest storage and increased germination.

145. Choubey, U. 1978. Studies on seed borne fungi of mung with special reference to Fusarium species. M.Sc.(Ag.) Thesis, JNKVV, Jabalpur, M.P., India: 96 pp

In all 15 fungi were isolated from 13 samples of seeds collected from eight districts of Madhya Pradesh. Among five species of Fusarium i.e. F. oxysporum, F. solani, F. semitectum, F. equiseti, and F. moniliforme, the first was associated with 34% seeds. This is the first report of F. oxysporum to be seed borne in mungbean. It caused seed rot, seedling rot, pod rot and wilt. Blotter test was good for fungal detection on mungbean seeds but for the detection of F. oxysporum agar plate method was best. Water at pH 6 when used in moistening blotters, proved excellent. Czapek's dox agar was also a good substitute to agar plate method. Seed exudate of

mungbean inhibited spore germination of F.oxysporum. Cellulolytic and pectinolytic enzymes were responsible for maceration of seed tissues. Infected seeds had less protein and more non reducing sugars as compared to the healthy ones. In the in vitro tests, Bavistin, ceresan dry and Agrosan GN performed well but Dithane M-45 and Thirum were promising in the in vivo tests.

146. Chaudhary, G.G., Mathur, A.K. and Tyagi, R.N.S.1981. Reaction of mung cultivars to yellow mosaic virus of mung (Phaseolus aureus) in Rajasthan. Indian Journal of Mycology and Plant Pathology,11:273-274.

Of the 198 Vigna radiata lines tested, P_{20}, P 68, P 82, P 84, P 86, P 94, P 332, P 367, P 369, P 453, P 670, EC 103127, H 70-5, LM 150, LM 172, LM 290, No.525 and China selection were resistant to MYMV.

147. Chavda, J.C., Patel, B.A. and Patel, D.J. 1986. Susceptibility of certain mungbean varieties to reniform nemadode. Rotylenchulus reniformis. Pulse Crops Newsletter, 6: 52.

Thirty three mungbean varieties were screened against reniform nemadode on the basis of number of females penetrating roots as follows-

Immune (0 female/plant), resistant (1-10 females per plant), moderately resistant (11-20 females/plant), susceptible (21-30 females/plant) and highly susceptible (more than 30 females/plant). Only ML 56 and Pusa 105 were resistant while PDM 54, PLM 572, PS 16, ML 5, MUG 125 & Suman were moderately resistant.

148. Chenulu, V.V. 1984. Plant virology in India- Past, Present and Future. Indian Phytopathology, 37:1-20.

Review on development of virology in India is given. Virus diseases of soybean & pulses are briefly referred.

149. Chenulu, V.V., Venkateswarlu, V. and Rangaraju, R. 1979. Studies on yellow mosaic disease of mungbean. Indian Phytopathology, 32: 230-235.

Investigations on the relationship of mungbean yellow mosaic virus and its vector Bemisia tabaci showed that the primary as well as the first trifoliate leaves were suitable for transmission of the virus. The percentage of transmission of the virus was influenced by acquisition feeding time, transmission feeding time, number of insects per plant and the resistant or susceptible nature of the test plant. A latent period of 5-6 hrs in the white flies was found necessary for transmission. Pre and post acquisition fasting did not influence the transmission efficiency of the virus. There was no evidence of transovarial transmission. None of the 13 varieties tested were found resistant to the virus infection although they differed in their degree of tolerance. Three sprays of Anthio at 0.2% reduced the yellow mosaic incidence significantly.

150. Chhabra, K.S. and Kooner, B.S. 1980. Sources of white fly Bemisia tabaci G. and yellow mosaic virus resistance in Vigna radiata Wilczek. Tropical Grain Legume Bulletin No.19: 26-29.

Out of 7 cultivars having resistance to whitefly and mungbean yellow mosaic virus, ML 1 and ML 3 performed excellently followed by ML 5 and IM 170.

151. Chhabra, K.S., Kooner, B.S. and Singh, G. 1979. Field resistance of certain cultivars of mungbean to white fly, Bemisia tabaci G. and yellow mosaic virus. Journal of Resea rch, Punjab Agricultural University, 16: 385-388.

Four new mungbean cvs. were all more resistant to MYMV than the infestor (a mixture of highly susceptible cvs) over 3 crop seasons in field test. ML 1 & ML 3 performed best.

152. Chindhalore, J.L. 1974. Studies on the role of seed borne pathogens of mung causing seed and seedling diseases and their control. M.Sc.(Ag.) Thesis, JNKVV, Jabalpur, M.P., India. pp. 58.

In all 13 fungi were found associated with mung seeds. Fusarium equiseti and Macrophomina phasolina were pathogenic and internally seed borne. Both caused pre and post emergence losses. F. equiseti infected pods also. Out of several fungicides, insecticides and weedicides tested in vivo and in vitro, a combination of Brassicol + Thirum as seed treatment alongwith Dyrsten as soil treatment proved best in field against these pathogens. Maximum fungi were present on the surface soil which indicates the need of applying chemicals on the surface soil.

153. Chohan, J.S. 1968. Disease problems in pulse crops. Proceedings II Annual Workshop Conference Pulses, IARI, New Delhi.

Diseases of pulse crops including mungbean and urdbean occurring in Punjab are described.

154. Chohan, J.S. and Kaur, J. 1976. Cultural studies on R. bataticola causal agent of root rot of sunflower. Indian J. of Mycology and Plant Pathology, 6: 140-144.

Three isolates of R. bataticola from sunflower and one from urd stem were studied. Urd isolate had minimum hyphal width (1.15 μ). No significant difference in manner or behaviour of sclerotia formation & colour was noted. All were virulent to sunflower and resulted in brown lesions in the form of steak/girdle on stem.

155. Chona, B.L. and Munjal, R.L. 1956. Notes on miscellaneous Indian fungi III. Indian Phytopathology, 9 : 53-66.

A new species, Mycosphaerella phaseoli, is reported on Phaseolus aureus. It has perithecia 105 to 126 µ in diameter with an ostiole 28 to 35 µ, the asci measuring 40 to 52 x 6 to 7 µ and the ascospores 8 to 14 x 3 to 4 µ. C. kikuchii is considered as conidial stage.

156. Chopra, S.L. and Pruthi, S.P. 1971. Effect of Plantvax on the chemical composition of blackgram (Phaseolus mungo Roxb.). Indian Journal of Agricultural Sciences 41: 345-349.

Seed treatmen of black gram by plant vax reduced the reducing, non reducing and total water soluble sugars and true protein contents.

157. Chopra, S.L. and Pruthi, S.P. 1973. Effect of Plantvax (2, 3-dihydro-5-carboxinilido-6-methyl 1, 4-oxathiin 4, 4-dioxide). On the germination of black gram (Phaseolus mungo). Journal of Research, Punjab Agricultural University, 10: 86-90.

Seeds of black gram were treated with Plantvax @50, 150, 250 & 300 g/45 kg. The reducing, non reducing and total water soluble sugars and true proteins were lower in treated seeds. Fungicide application delayed seed germination. Fungicide did not suffer any degradation during germination.

158. Chowdhury, A.K. and Saha, N.K. 1985. Inhibition of urdbean leaf crinkle virus by different plant extracts. Indian Phytopathology, 38:566-568.

Out of 15 plant extracts tested in vitro, Zinger had maximum inhibition of 58.13% in 1 hr. incubation. It was turmeric in case of incubation for 2 hrs. In vivo tests, inhibition was reduced with maximum of 41.18% i.e. Alium cepa.

159. Chowdhury, A.K. and Chowdhury, S.R. 1983. Effect of buffers of different pH on the infectivity of urid leaf crinkle virus (ULCV). Geobios, 10: 34-35.

Data are presented on the infectivity of sap extracted with different buffers and at different pH, from Vigna mungo plants infected with urdbean leaf crinkle virus.

160. Chowdhury, A.K. and Nath, P.S. 1983. A rapid method of inoculation of urdbean leaf crinkle virus (ULCV) using germinated seeds. Indian Journal of Experimental Biology, 21: 158.

Vigna mungo seeds were shaken with preparation of ULCV for periods of 30 s - 2 min. Plants from inoculated seeds developed symptoms, transmission being highest after 30 s shaking and 90% when the germination period was 48 hrs.

161. Chowdhury, J.R. and Srivastava, R.S. 1986. Effect of common bean mosaic Virus infection on nitrite reductase activity in leaf tissues of mungbean. Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz, 93: 33-36.

Infection of bean common mosaic virus decreased the activity of nitrite reductase in leaf tissues of V. radiata cv. Pusa Baisakhi plants grown from untreated seeds more than in plants from seed inoculated with Rhizobium phaseoli. Rhizobium treatment was more effective in enhancing NiR activity in virus inoculated & virus free plants grown in soil than those grown in sand. Activity was maximum 10 and 20 days after inoculation in soil and sand, respectively.

162. Chowdhury, J.R., Srivastava, R.S. and Singh, R.1985. Effect of common bean mosaic virus and Rhizobium on the amino acid contents in mungbean (V. radiata (L.) Wilczek.). Rivista di Agricoltura Subtropicale e Tropicale, 79: 411-424.

In pot trials the maximum concentration of amino acids was on the 40th & 50th day after inoculation with bean common mosaic virus in plants grown on sand & soil respectively. The conc. was highest in leaves, followed by that in the root and stem. On sand the conc. was higher in plants not treated with Rhizobium.

163. Chowdhury, J.R., Srivastava, R.S. and Singh, R.1987. Effect of common bean mosaic virus infection on nitrogenase activity in root nodules of mungbean. Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz. 94: 126-129.

In case of cv. Pusa Baisakhi, infection by BCMV enhanced nitrate nitrogen and total amino acids but decreased nitrogenase activity and leghaemoglobin content in root nodules. All parameters had higher values in healthy as well as infected plants when grown in soil as compared to those grown in sand.

164. Chupp, C. 1954. A monograph of the fungus, genus Cercospora. pp. 667.

Species of Cercospora are described on Phaseolus species.

165. Cody, Y.S. and Maloy, O.C. 1984. Cylindrocephalum rot of mungbean sprout. Plant Disease, 68:304-305.

A fungus causing a destructive rot was isolated from mungbean sprout. Symptoms first appeared as small pink to orange spots on cotyledons or hypocotyl in U.S.A. Under the moist conddtions required for sprouting, the sprouts became slimy and greif. Inoculation with a high spore conc. (4.6×10^5/ml) induced 94% decayed sprouts whereas decreasing concentration caused progressively less decay. The fungus tentatively identified as C. sp. was isolated from lesions on the sprouts.

166. Cooper, W.E. 1949. Top necrosis, a virus disease of Guar. Phytopathology, 39: 347-358.

Top necrosis a virus disease has been reported on Guar and the virus is sap transmissible to P. aureus.

167. Cortalo, R.V. 1972. The control of mungo mosaic by insecticide spray against the aphid. Philippines Phytopathology, 8: 2(Abstr.).

Reported mungbean mosaic in Philippines and evaluated insecticides for control of aphids to check the disease spread.

168. Dahiya, B.S., Singh, K. and Brar, J.S. 1977. Incorporation of resistance to mungbean yellow mosaic virus in black gram (V. mungo L.). Tropical Grain Legume Bulletin, No.9: 28-32.

The resistance of black gram (P. mungo) cvs. LU 220 and LU 237 to MYMV appeared to be due to a single dominant gene.

169. Dale, W.T. 1943. Preliminary studies on the plant viruses of Trinidad. Tropical Agriculture(Trinidad), 20: 228-235.

A preliminary test indicated that Ceratoma ruficornis may be the vector of mosaic of wooly pyral (P. mungo)

170. Dale, W.T. 1949. Observations on a virus disease of cowpea in Trinidad. Annals of Applied Biology, 36: 327-333.

Young P. mungo and P. aureus plants react with cowpea mosaic by the production of chlorotic local lesions, followed by striking yellow vein clearing of the first young leaf to unfold after infection. Severe green and yellowish mottling of leaves developping later may be accompanied by blistering of the lamina.

171. Das, S.N., Routray, B.N. and Sahoo, H. 1986. Reaction of some green gram varieties to root knot nematode, Meloidogyne incognita. Indian Phytopathology, 39: 126-128.

On the basis of average gall index, av. egg mass/ plant and av. number of egg/larvae per plant, ML 62, K 851, TAP 7, PDM 14, T 44 were graded as resistant while ML 5, ML 80, TT 8E, TT 9[illegible], Hy b 12-4, ML 3 and ML 70 were moderately resistant. Kopergaon, V 1163, PS 16, Pant 101, UPN 79-1-1, Pusa Baisakhi were highly susceptible. PIMS 1, 3, 4, Pusa 103, ML 13 and TT 2E were susceptible.

172. Dasgupta, B. and Chowdhury, A.K 1985. Use of intervarietal intercropping to minimize the yellow mosaic virus of urd and mung beans. Indian Journal of Plant Pathology, 3:100-101.

Incidence of Bemisia tabaci trabsmitted mungbean yellow mosaic virus in experimental plots of 2 cvs. of mungbean and urdbean was reduced by intervarietal intercropping. Although the rate of spread of the disease was higher in some intercropped fields than in pure stands, the percentage infection was lower in the farmer.

173. Davide, R.G. 1972. Nematodes of Philippines crops and their control. Philippine Phytopathology, 2:34.

Reported root knot (Meloidogyne spp.) and root lesion or root rot caused by Pratylenchus spp. in mungbean.

174. Deshkar, M.V., Khare, M.N. and Joshi, L.K. 1973. Paper towel method- a rapid technique for testing susceptibility to Rhizoctonia bataticola (Taub.) Butler. JNKVV Research Journal, 7:300-301.

Paper towels 30 x 30 cm were sterilized and one surface was dipped in mycelial suspension of R. bataticola. Ten surface sterilized mungbean seeds were dipped in the inoculum and placed in the folds of the towel. The towels were kept for three days at 25-28°C in a moist chamber. More infection developed than with other methods. Less time was taken in screening.

175. Deshkar, M.V., Khare, M.N. and Singh, L. 1974. Evaluation of varieties of mung (Phaseolus aureus Roxb.) for their resistance to Rhizoctonia bataticola (Taub.) Butler by paper towel method. JNKVV Research Journal, 8: 60-62.

Data on 163 varieties are tabulated. One was moderately susceptible to R. bataticola and the rest were susceptible.

176. Devi, T.P. and Sam, P.N. 1986. Culturing of powdery mildew on black gram and green gram callus tissues. Madras Agricultural Journal, 73: 474-475.

When callus tissues of green gram and black gram obtained from excised shoot tips, hypocotyl and the first pair of leaves were grown on Gamborg's medium and inoculated with conidial suspension of E.polygoni, profused fungal growth was obtained after 10 days of inoculation. The type of growth and conidial characters were maintained after subculturing & pathogenicity was confirmed.

177. Dey, S.K., Singh, R.A. and Shukla, T.N. 1970. Varietal reaction against mung yellow mosaic. Recent advances in crop production, U.P. Institute of Agricultural Sciences, Kanpur, U.P., India: 248-249.

Testing of mung lines was done against yellow mosaic by grafting. Four lines, 5908-2, 6410, 6501 and 6701 were resistant with no infection. Five lines, 12-2/19-1, 158-1/2, 166/10/1-1, 4409-3 and 6401 A were moderately

resistant with 0.1 to 20.0 per cent infection. Rest of the lines were susceptible.

178. Dey, S.K. and Singh, D.R. 1973. Resistance test of mung (Phaseolus aureus L.) against yellow mosaic in Uttar Pradesh. Indian Journal of farm Sciences, 1:113.

Of 496 varieties and cultures examined in field and glasshouse, only P 364-68 and P 366-68 were found to be resistant to mungbean yellow mosaic virus.

177. Dhingra, K.L. 1975. Transmission of urdbean leaf crinkle virus by two aphid species. Indian Phytopathology, 28: 80-82.

A virus causing crinkling of the leaves in P. mungo was transmitted by Aphis craccivora and A.gossypii. A short [illegible] acquisition period (30 s to 2 min.) preceded by a pre-acquisition fasting was necessary for successful transmission.

1880 Dhingra, K.L. and Chenulu, V.V. 1981. Studies on the transmission of urd leaf-crinkle & chickpea leaf reduction viruses by Aphis craccivora Koch. Indian Phytopathology, 34: 38-42.

Myzus persicae (Sulz) was found to be an additional vector of urd leaf crinkle virus. Pre-acquisition starvation of Aphis craccivora increased percentage transmission of ULCV and chickpea leaf reduction virus (CpLRV). Maximum transmission was at 10 aphids per test plant which has been allowed acquisition access for 30 s preceeded by pre-acquisition fasting of 2 hrs for CpLRV & 4 hrs for ULCV. Infectivity was lost within 30 & 10 min., respectively showing their non persistant nature. A tapping aphid inoculation technique was found superior to conventional brush inoculation technique for the virus transmission.

181. Dhingra, O.D. 1971. The relationship of Rhizoctonia bataticola to the fungal flora in rhizosphere of urd. (Phaseolus mungo L.). M.Sc.(Ag.) Thesis, JNKVV., Jabalpur : 88pp.

In all 43 fungal species were isolated from soil. Species of Fusarium, Aspergillus and R. bataticola were more associated with roots of younger plants. Type of rhizosphere fungi varied with growth phase of the plant and climatic conditions. Less number of fungi were present around the living plant than a dead plant. Fusarium oxysporum, F. semitectum, A. niger, A. nodulans, M. phaseolina were associated with root surface throughout the year while F. chlamydosporum was associated with all the plant parts. Eleven fungi were found antagonistic against R. bataticola. Most effective antagonists were Arachniotus sp. and Aspergillus aculeatus which could protect the seed and seedlings against R. bataticola.

182. Dhingra, O.D. and Khare, M.N. 1973. Biological control of Rhizoctonia bataticola on urdbean. Phytopathologische Zeitschrift, 76: 23-29.

Of 38 soil fungi isolated from Rhizosphere and non Rhizosphere soils of P. mungo tested against R. bataticola, Arachniotus sp., Aspergillus aculeatus, Cephalosporium humicola and Trichoderma lignorum were most active in producing toxins in vitro. In pot experiment Arachniotus sp. and A. aculeatus applied to the seed controlled damping off giving total stand 73 and 69.7%, respectively in non autoclaved field soil.

183. Dolores, A.C. 1975. Studies of a yellow mosaic disease of mungo (Phaseolus aureus Roxb.). B.S. Thesis, UPLB.

Described yellow mosaic on mungbean which is seed and sap transmitted also but not by white fly.

184. Dubey, G.S., Sharma, I. and Pradhan, N. 1983. Some properties of urdbean leaf crinkle virus. Indian Phytopathology, 36: 762-764.

ULCV from urd was transmitted by Aphis craccivora and Acyrthosiphon pisum (New record). It was isometric particles 320 A°. Serology was also tested.

185. Dublish, P.K. and Pande, P.C. 1976. Effect of culture filtrates of certain rhizosphere fungi on seed germination and seedling growth of Phaseolus mungo L., Luffa cylindrica M. Roem. and Cucumis sativus L. Bangladesh Journal of Botany, 5: 39-42.

Culture filtrates of Cladosporium herbarum and Trichoderma lignorum had adverse effect on germination of P. mungo, P. cylindrica and cucumber while those of Aspergillus niger and F. oxysporum reduced the root and shoot growth of some of the test crops. Germination was also promoted by some fungi.

186. Duke, S.O., Wickliff, J.L., Vaughn, K.C. and Paul, R.N. 1982. Tentoxin does not cause chlorosis in greening mungbean leaves by inhibiting photophosphorylation. Physiologia Plantarum, 56:387-398.

Effect of the toxin, purified from cultures of Alternaria alternata, on plastids of primary leaves of Vigna radiata were studied using spectrophotometric, electrophoretic and microscopic procedures. The data were consistent with the view that tentoxin disrupts normal etioplast and chloroplast development through a mechanism unrelated to photophosphorylation.

187. Dunleavy, J. 1967. Red clover infected by Cephalosporium gregatum. Report of the Department of Scientific and Industrial Research, Newzealand, (1967); 96pp.

Isolates of Cephalosporium gregatum from effected clover were similar to those from soybean. This pathogen has only been recorded on mungbean in addition to soybean.

188. Dwivedi, K. and Shukla, P. 1979. A new leaf spot disease of mung caused by Drechslera halodes (on Vigna radiata). Indian Journal of Mycology and Plant Pathology, 9: 281.

A leaf spot of mungbean characterized by spots oval in begining but elongated later, coalescing at advance stage resulting in leaves turning dark reddish brown was recorded. Spots also appeared on stems and petioles and leaves droop & dried. The cause was identified as Drechslera halodes Drechsler.

189. Dwivedi, K. and Shukla, P. 1980. Amino acid changes in mung foliage infected with Drechslera halodes. Indian Journal of Mycology and Plant Pathology, 10: 192-193.

The changes in concentration in healthy and infected mungbean leaves are tabulated. Amino acid content decreased during the early period of infection but later in severe stages it increased.

190. Dwivedi, K. and Shukla, P. 1981. Effect of interaction of nitrogen, phosphorus and potash on Drechslera leaf spot of mung. Indian Phytopathology, 34:200-202.

Plants receiving different doses of N, P, K were infected but the disease intensity was inversely proportional to potassium levels. Phosphorus did not play any role . Nitrogen increased susceptibility while potassium increased resistance.

191. Dwivedi, K. and Shukla, P. 1983. Perpetuation of Drechslera halodes causing leaf spot disease of mung. Indian Phytopathology, 36: 427-430.

The pathogen perpetuated in plant residues for more than 8 months under natural conditions. Low temperature helps in survival. Seed did not carry inoculum for primary infection.

192. Dwivedi, K. and Shukla, P. 1983. Some new hosts of Drechslera halodes. Indian Journal of Mycology and Plant Pathology, 13: 202.

Lentil, pea, urd, coriander, bhindi, Gossypium dactylon, Solanum nigrum, Celosia cristata, Chrysanthimum sp., Tagetes erecta. & Euphorbia hirta were infected.

193. Dwivedi, K. and Shukla, P. 1983. Evaluation of some fungicides and antibiotics against Drechslera halodes causing leaf spot of mung. Pesticides, 17(4):21-22.

The mung pathogen proved sensitive to thiram, cumanL, ferbam, zineb, captan & Aureofungin in vitro. In pot test a foliar spray of zineb was highly effective and captan, Aureofungin and cuman also gave good control. As soil drenches, thiram & brassicol were most effective.

194. Dwivedi, R.P. and Saxena, H.K. 1974. Occurrence of web blight by Thanatephorus cucumeris on mungbean. Indian Journal of Farm Science, 2: 100.

Rhizoctonia solani attacks mungbean seedlings at ground level. On leaves mycelial growth is observed causing web blight phase. Under white mycelial growth, basidia & basidiospores are produced which is the perfect stage of the fungus, Thanatephorus cucumeris. This is produced under well shaded damp conditions. The pathogen infects more than 20 hosts. The disease symptoms are described.

19.5. Dwivedi, S. and Singh, D.P. 1985. Inheritance of resistance to yellow mosaic virus in a wide cross of black gram (V. mungo (L.) Hepper). Zeitschrift fur Pflanzenzuchtung, 95: 281-284.

Analysis of F_1-F_3 segregation data from a cross between the highly susceptible V. mungo var. Sylvestris (Type B) and the highly resistant V. mungo line Pant U-84 revealed that resistance is controlled by 2 independent recessive genes, these are designated ymv_1 & ymv_2.

19.6. Dye, D.W., Bradbury, J.F., Goto, M., Hayward, A.C., Lelliott, R.A. and Schroth, M.N. 1980. International standards for naming pathovars of phytopathogenic bacteria and a list of pathovars names & pathotype strains. Review of Plant Pathology, 59:153-168.

Bacterial pathogens have been named on the basis of host plant. Xanthomonas phaseoli infecting mungbean has been named as X. campestris pathovar. Vignaeradiatae (Sabet, Ishag & Khalil) Dye. Pseudomonas phaseolicola is remamed as Pseudomonas syringae pv phaseolicola (Burkholder) young, dye & Vilkie.

19.7. Elazegmi, F.A. and Mew, T.W. 1983. Comparative effects of fungicides on pre emergence damping off of grain legumes caused by Rhizoctonia solani, Sclerotium rolfsii & Pythium debaryanum. Tropical Grain Legume Bulletin No.27: 2-7.

The most promising seed treatment against R. solani on cowpea, mungbean & soybean was PCNB + thiabendazole. Mancozeb, thiram & Captex were also good. Against S. rolfsii carboxin + captan was best. Carboxin + thiram & captan were also good. P. debaryanum was controlled best by CGA 48988 & orthocite RE-26745 followed by carboxin + thiram & carboxin + captan. None was phytotoxic.

197. Endo, S. 1931. The host plants of Hypochnus centrifugus (Lev.) Tul. ever recorded in Japan. Transaction Tottori Society of Agricultural Sciences, 3: 254-270.

Reported H. centrifugus (S. rolfsii) on Phaseolus radiatus L. (mungo).

198. Epps, J.M. and Chambers, A.V. 1959. Mungbean (Phaseolus aureus), a host of soybean cyst nematode (Heterodera glycine). Plant Disease Reporter, 43:981-982.

Mungbean was reported as a new host for the soybean cyst nematode (Heterodera glycine).

200. Fang, C.T., Chen, H.Y. and Chu, C.L. 1964. A comparative study of the species of the genus Xanthomonas from leguminous plants. Acta Phytopathologica Sinica, 7: 21-31.

Bacterial leaf spot of mung (X. campestris pv. phaseoli (Smith) Dye first reported from China. Made a comparative study of 18 isolates from 7 leguminous hosts. Reported that although there was over lapping in host range and similarity in cultural, physiological & biochemical characters but isolates were more virulent on their natural hosts. On this basis it was suggested that each isolate should be considered as a strain or race of X. phaseoli (Smith) Dowson.

201. Farrag, S.H. and Kandaswamy, T.K. 1979. Soybean and green gram as local lesion assay hosts for sugarcane mosaic virus. Current Science, 48: 865.

Local lesions developed on the 2nd trifoliate leaves of V. radiata plants, 2 days after inoculation by SMV. Lesions were irregular & purple on mung. This is first report of local lesions on dicotyledonous hosts by graminaceous virus.

202. Fedetova, M.T.I. 1938. The serological method of determining the varietal resistance of plants to disease. Plant Protection Leningrade, 16: 50-58.

Different degree of resistance of P. aureus to bacterial diseases is reported.

203. Frange, N.S. 1972. The effect of six fungicides on anthracnose of mungo (Phaseolus aureus). B.S. Thesis, College of Agriculture, UPLB, Laguna, Philippines.

204. Fry, P.R. 1959. A clover mosaic virus in New Zealand pastures. New Zealand Journal of Agricultural Research, 2: 971-981.

The virus was transmitted to P. aureus mungbean besides many other hosts. The transmission was mechanical.

205. Garg, I.D. and Mandahar, C.L. 1977. Physiology of Phaseolus mungo leaves infected with bean yellow mosaic virus. Indian Phytopathology, 30: 123-124.

The role of respiration, photosynthesis and carbohydrates of infected and healthy urdbean variety Sindkheda 1-1 plants was investigated to understand the retardation in growth, late fruiting and less yield due to the disease. Rate of respiration was higher in diseased plants but the net photosynthesis was lower. Chlorophyll and starch contents decreased in infected leaves. Sugar contents of infected leaves was higher by 15.2% at the time of symptom appearance but became lower afterwards.

206. Gaur, R.B. and Ahmed, S.R. 1983. Studies on the chemical control of bacterial blight of mung incited by Xanthomonas phaseoli (Smith) Dowson. Pesticides, 17 (2): 22-23.

Results of a 3 year field trial showed that Xanthomonas (campestris pv.) phaseoli was effectively controlled on mung by 3 sprays of Agrimycin 100 Streptomycin (0.025%) + Bavistin (0.1%) and Plantomycin (0.025%) + Bavistin (0.1%).

207. Gaur, R.B., Ahmed, S.R. and Kataria, P.K. 1984. Controlling Xanthomonas phaseoli (Smith) Dowson of mung seed through chemotherapy & heat therapy. Hindustan Antibiotics Bulletin, 26: 23-26.

Pathogen in mung seed was inactivated by hot water treatment at 52°C for 20 min while long lasting control was given by Agrimycin (700 ppm) as seed dressing. Field trials showed effective control of the disease by three sprays of Agrimycine 100 (0.025%) + Bavistin (0.1%).

208. Ghanekar, A.M. and Beniwal, S.P.S. 1975. Cowpea a local lesion host for mungbean leaf curl virus. Indian Phytopathology, 28: 527-528.

On inoculation, necrotic lesions circular, dark red were produced on cowpea variety C-20.

209. Ghanekar, A.M., Reddy, D.V.R. and Amin, P.W. 1979. Leaf curl disease of mung and urdbeans caused by tomato spotted wilt virus. Indian Phytopathology, 32: 163. (Abstr.).

A virus causing leaf curl disease of mung and urdbean was identified as tomato spotted wilt virus (TSWV). Characteristic symptoms of the disease were downward curling of leaves, veinal necrosis, chlorotic areas on the lamina, stunting & death of plant due to apical necrosis. The virus was identified on the basis of serological reactions with TSWV antiserum employing hemagglutination, transmission by Scirtothrips dorsalis, low thermal inactivation point and reaction on Petunia hybrida, Vigna unguiculata & Lycopersicun esculentum.

210. Ghani, Arif, A. and Munjal, R.L. 1955. The causal fungus of the blight disease of Phaseolus in the Punjab. Pakistan Journal of Sciences & Research, 7(3): 83-92.

Phyllosticta phaseolarum and Ascochyta phaseolorum caused heavy damage to both Urdbean and mungbean crops. Their taxonomy, cultural studies and inoculation experiments are discussed.

211. Gill, A.S., Verma, M.M., Dhaliwal, H.S. and Sandhu, T.S. 1983. Interspecific transfer of resistance to mungbean yellow mosaic virus from Vigna mungo to Vigna radiata. Current Science, 52: 31-33.

Hybridization between resistant V. mungo and susceptible V. radiata lines was achieved and selected lines with good yield and resistance to the virus were obtained.

212. Gill, K.S., Sandhu, T.S., Singh, K. and Brar, J.S. 1975. Evaluation of mungbean (Vigna radiata (L.) (Wilczek) germ plasm. Crop Improvement, 2:99-104.

Out of 435 strains of mungbean from 19 countries, two strains 15229 and L 24-2 were resistant to yellow mosaic virus and bacterial wilt and 15229 was also resistant to Cercospora leaf spot.

213. Godse, D.B., More, B.B. and Patil, B.L. 1976. Effect of common bean mosaic virus infection on nodulation of mung (P. aureus Roxb.). Journal of Maharashtra Agricultural University, 1: 310-311.

Number of nodules, dry weight of nodules as well as of plants were reduced by infection of Pusa Baisakhi with BCMV. Data were significant in case of dry weight of nodules only.

214. Golato, C. 1966. Bean rust in Somalia. Riv. Agric. Subtropical & Tropical, 60 (4/6): 178-181.

Uromyces appendiculatus is reported for the first time from Somalia on P. mungo. Symptoms and morphology are described.

215. Golato, C. 1967. Cercosporiosi del Fagiolo in Sumalia. Riv. Agric. Subtropical & Tropical, 61(4-6) :159-162.

Symptoms and morphological characters of Cercospora columnaris (Isariopsis grigeola) are described on urdbean.

216. Golato, C. 1967. Malattie delle plante coltivate in Somalia (Diseases of cultivated plants in Somalia), pp.147.

Morphological characters, symptoms, manner of spread and damage caused by fungal and bacterial pathogens on several crops including P. mungo are described. Influence of the environment on the disease severity and control measures are also indicated.

217. Grewal, J.S. 1977. Diseases of mungbean in India. Proceedings First International Mungbean Symposium, AVRDC, Taiwan. pp. 165-168.

Yellow mosaic, leaf crinkle, Cercospora leaf spot (C. canescens) powdery mildew (E. polygoni), root rot (R. bataticola and R. Solani), bacterial leaf spot (X. phaseoli), halo blight (P. phaseolicola) are described. Screening of lines was done at various locations. L 24-2-1, 15227 were free from yellow mosaic at Delhi. LM 162 was graded as resistant to Cercospora leaf spot at Ludhiana. The line 29-13-2 was free from powdery mildew at Badnapur. At Coimbatore LM 220 and MS 9385 were resistant to R. bataticola. Out of 2160 germ plasm lines, 29 proved resistance to X. phaseoli. Bavistin 0.5 kg/ha reduced the incidence of Cercospora leaf spot and increased the yield by 50%. For powdery mildew 3-4 sprays of Wettable sulphur (3 kg/ha) at 10 days interval starting from appearance of the disease were effective. An increase of 35-100% in yield was recorded.

218. Grewal, J.S. 1980. Diseases of pulse crops- an overview. Indian Phytopathology, 41: 1-14.

Description of diseases of pulse crops including black gram and green gram has been given. Yellow mosaic of mungbean is reported serious in M.P., Bihar, Punjab, Haryana, Tamil Nadu and Uttar Pradesh states of India causing 10-100% losses. Resistant varieties of mungbean and chemical control is given. Leaf spot caused by Cercospora cruenta, C. cnnescens, C. dolichi and C. kikuchi may cause 47% loss in yield. Their symptoms and control measures are given. Other diseases described are leaf crinkle (viral) of urdbean & mungbean, dry root rot and seedling blight (R. bataticola), bacterial leaf spot (X. campestris pv. vignaeradiatae) and powdery mildew.

219. Grewal, J.S., Pal, M. and Kulshrestha, D.D. 1980. Control of Cercospora leaf spot of green gram by spraying bavistin. Indian Journal of Agricultural Sciences, 50: 707-711.

Bavistin at 500 g/ha in 1000 l water, sprayed 30 & 45 days after sowing was superior to benomyl, dithane Z-78 and captan in reducing Cercospora leaf spot on Vigna radiata to 10.5- 12.5% as compared with 45.1 -75% in the control. It increased the yield by 2.3-3.82 q/ha over that of unsprayed plots. In 1977 & 1978, bavistin was as effective at 300 g/ha as 500 g/ha. It reduced infection to 12.4-15.6% and increased yield by 3.1-3.37 q/ha.

220. Grover, R.K. and Chopra, B.L. 1977. Seed, soil and foliage treatments with carboxin and oxycarboxin for control of Rhizoctonia species and their toxicity to other fungi. Pesticides, 11(9): 38-41.

Root rot of urdbean caused by R. solani was controlled by carboxin seed treatment.

221. Grover, R.K. and Sakhuja, P.K. 1981. Some pathological studies on Rhizoctonia bataticola leaf blight of mungbean. Indian Phytopathology, 34: 24-29.

R. bataticola caused a severe blight of mungbean foliage at 30 to 35°C when 4-8 days old inoculum was used and inoculated plants were kept for 8-24 h at high humidity. Root and Collar region could be infected artificially by the foliage isolates. No cultivar or advance line was resistant. On mungbean R. bataticola isolates from sesamum and castor were more aggressive than groundnut isolate. Host range of the pathogen was restricted. It was extremely seed borne. Symptoms are described.

222. Gupta, B.M. 1970. New disease on mungbean from Udaipur, Rajasthan, India. Plant Disease Reporter, 54: 453.

Alternaria alternata was newly recorded from diseased leaves of Phaseolus aureus.

223. Gupta, B.M. and Reddy, G.S. 1975. Physiological studies on Alternaria alternata (Fr.) Keissl., the incitant of leaf spot of mungbean (Phaseolus aureus Roxb.) Labdev B, 13: 217-218.

The results are presented of the carbon, nitrogen and growth regulator requirements in vitro.

224. Gupta, D.C. and Yadav, B.S. 1979. Studies on the pathogenicity of reniform nematode, Rotylenchulus reniformis to urd, Vigna mungo (L.) Wilczek. Indian Journal of Nematology, 9: 48-50.

Reniform nematode was reported to be pathogenic on urdbean.

225. Gupta, D.C. and Yadav, B.S. 1982. Note on the pathogenicity and on relative susceptibility of green gram varieties to Rotylenchulus reniformis. Indian Journal of Agricultural Sciences, 52:41-42.

The fresh root weight was reduced in treatments with 1000 & more nematodes/500 g soil. It also reduced nodulation. Reproduction potential of nematodes in soil was maximum at 100 nematodes/500 g soil and thus was density dependent. Of 33 varieties minimum number of total eggs (440) was in T 44, and egg masses produced were similar to those produced at cowpea.

226. Gupta, P.K. and Gupta, J.S. 1984. Storage deterioration of mungbean seed by fungi. International Journal of Tropical Plant Diseases, 2: 169-173.

Studies on the deterioration of 2 cultivars of mung local NSC 'S 8' and Type 1 at an interval of 4 months indicated a significant rise in the total incidence of moulds accompanied by considerable loss in germinability. Seed analysis revealed a fall in total nitrogen, protein & non-reducing sugars while there was an increase in reducing sugars. Only 4 of the 14 aminoacids and 3 of the 6 sugars detected prior to storage were left in seeds after 24 months, though 2 aminoacids & 4 sugars appeared afresh during storage. A total of 34 fungi were isolated from stored seeds.

227. Gupta, P.K. and Gupta, J.S. 1981. Mycobial seed deterioration of Phaseolus aureus during storage. Third International Symposium on Plant Pathology, IPS, New Delhi, pp.217.

Two varieties of mung were stored for 2 years. There was a significant rise in mould incidence accompanied with loss in germination. Biodeterioration of seeds exhibited a fall in nitrogen, total protein and non reducing sugars but reducing sugars increased. In all, 34 fungi were encountered.

228. Gupta, P.K. , Gupta, J.S., Singh, S. and Deo, P.P. 1982. Studies on aflatoxin production by some new strains of Aspergillus flavus associated with stored seeds of mung (Phaseolus aureus) in Agra market. Indian Journal of Mycology and Plant Pathology,12:315.

Out of 16 strains of A. flavus isolated from mung seed /DAL, 12 were aflatoxigenic. Seed germination was also inhibited. Strains having deeper yellow to orange colour, crinkled growth & larger sclerotia favoured more toxin exhibited by chlorosis.

229. Gupta, P.K. and Singh, J. 1983. Effect of systemic granular insecticides on whitefly population and yellow mosaic infection in green gram. Indian Journal of Agricultural Science, 53: 737-742.

When applied @ 2 kg a.i./ha in summer as well as in rainy season, phorate 10 G, mephosfolan 5 G, disulfoton 5 G (disyston 5 G), disulfoton 5 G (Solvirex 5 G), carbofuran 3 G & aldicarb 10 G reduced whitefly population & yellow mosaic infection in mung. The maximum benefit : cost ratio was with 1 application of any of the 6 granular insecticides.

230. Gupta, R.B.L., Singh, G., Singh, R.R. and Solanki, J.S. 1975. Efficacy of different fungicides against powdery mildew of mung. Indian Phytopathology,28: 164-166.

Spraying of fungicides at fortnightly intervals significantly reduced incidence of Erysiphe polygoni on mungbean. Increased grain yield was obtained with sprays of Cosan, Karathane WD, elosal and thiovit.

231. Gupta, S.C. and Sinha, S. 1951. Further additions to the Synchytria of India. Indian Phytopathology, 4: 7-10.

Among the 5 new species of Synchytrium described from Agra S. phaseoli radiati Sinha & Gupta sp. Nov. was on P. radiatus and P. mungo. It has resting sporangia measuring 165-200 /u (mean 184 /u) in diameter with a wall 13-16.5 /u thick.

232. Gupta, V.K. 1974. Leaf crinkle, a virus disease of Phaseolus mungo L. in Himachal Pradesh. Indian Journal of Experimental Biology, 12: 477-478.

The leaf crinkle and phyllody disease of P. mungo was transmitted by grafting, through seed and by sap. The virus also infected P. aureus besides P. vulgaris and tobacco. The thermal inactivation point is between 70-75°C, dilution end point between 10^{-3} and 10^{-4} and infectivity is retained at room temperature for upto 96 hours.

233. Gupta, V.K. and Saharan, G.S. 1974. Epidemiological observations on leaf spot (Cercospora spp.) of black gram. Indian Phytopathology, 27: 606-608.

Plots sown on 23.6.71 nad maximum disease as compared to 30.6.71 & 7.7.71. Disease appears at plant age of 50-55 days but becomes serious at 80 days. It increased faster at 64-86°F. Wide spread rains during September were more congineal.

234. Gurha, S.N. 1981. Screening black gram germ plasm types for leaf blight disease (Macrophomina phaseolina) resistance. Madras Agricultural Journal, 68: 692.

Under field conditions of natural infection 7 of 102 germ plasm lines of black gram showed tolerance (0.5% plants infected). Of these only PLU 241, PLU 137 & 1/1 were also tolerance of artificial inoculation.

235. Gurha, S.N. and Gangal, L.K. 1980. Control of powdery mildew of green gram (Vigna radiata (L.) Wilczek). Madras Agricultural Journal, 67:666-668.

Thiovit was best followed by bavistin, sulphur dust & karathane. Highest yield was in bavistin followed by sulphur, sulphur dust and Karathane. Disease index & yield had a linear relationship with the fungicides.

236. Gurha, S.N. and Misra, D.P. 1982. Donors for resistance in black gram (Vigna mungo (L.) Hepper) against Xanthomonas phaseoli (Smith) Dowson. Madras Agricultural Journal, 69: 139-140.

Tolerance of X. (campestris pv.) phaseoli was shown by 6 of 196 germplasm types which were spray inoculated at seedlings.

237. Gurha, S.N. and Misra, D.P. 1983. A note on the field reaction of Cercospora leaf spot in black gram (Vigna mungo). Indian Journal of Mycology and Plant Pathology, 13: 351-352.

Of 183 genotypes tested under natural epiphytotic conditions, 3 were resistant, 6 moderately susceptible, 34 susceptible and rest highly susceptible.

238. Gurha, S.N., Misra, D.P. and Kamthan, K.P. 1982. Studies on some aspects of yellow mosaic disease of black gram (Vigna mungo (L.) Hepper). Madras Agricultural Journal, 69: 435-438.

Of 281 cultivars observed for their reaction to mungbean yellow mosaic virus under conditions of high natural infection, 15 remained free from infection, 11 were tolerant, 20 moderately tolerant, 33 susceptible and the remainder highly susceptible. A major setback to pod maturity and reduction in yield occurred at only 25% infection intensity so that material showing even this level of disease should not be used in the breeding programme.

239. Hamdollah- Zadeh, A. 1987. Powdery mildew of mung bean in Iran. Iranian Journal of Plant Pathology, 23(1-4): 37-103.

Sphaerotheca fuliginea was reported for the first time in Iran as the cause of powdery mildew of mungbean.

240. Hans, J.K. Tyagi, P.D., Kataria, H.R. and Grover, R.K. 1981. The influence of soil & other physical factors on the antifungal activity of carbendazim against Rhizoctonia solani. Pesticides 15.12: 425-432.

R. solani inhibited maximum at 20°C & pH 8.0. In mung, damping off was least when seed treated with carbendazim 1 g/kg & sown in river sand, pH 7 & 8, at 20°C. Control was better in soils kept moist by frequent watering than under water stress & was better in sandy loam than in clay loam.

241. Hansford, C.G. 1943. Contributions towards the fungus flora of Uganda. V. Fungi Imperfecti. Proceedings of Linnean Society, London (1942-43): 34-67.

Reported R. bataticola on mung and urd from Uganda.

242. Hartley, C. and Massie, F.W. 1929. Brooming disease of black locust (Robinia pseudocacia). Phytopathology, 19: 162-166.

Witches broom on R. pseudocacia is described. The author surmised that Rutgers figures an apparently systemic brooming disease of P. mungo in Java and notes that similar phenomenon have been reported in Dolichos biflorus and Crotalaria juncea.

243. Haware, M.P. 1972. A note on angular black spot of Phaseolus mungo and P. radiatus. JNKVV. Research Journal, 6: 55-56.

The disease caused by Protomycopsis patelii is severe in Madhya Pradesh, Uttar Pradesh, Rajasthan and Maharashtra, India. Symptoms and the pathogen are described.

244. Haware, M.P. and Pavgi, M.S. 1969. Laboratory evaluation of some fungicides and antibiotics for the control of angular black spot of legumes. Hindustan Antibiotic Bulletin, 12(1): 17-21.

In tests of resting chlamydospores of Protomycopsis patelii on P. mungo and P. radiatus all copper compounds and dithiocarbamic acid derivatives caused lysis of the vesicles of germinating chlamydospores at 0.2%; $HgCl_2$ was effective even at 0.1% and though bordeaux (1%) permitted germination, lysis occurred in the extruded vesicles. Aurecfungin and griseofulvin inhibited germination at 120 and 400 µg/ml respectively. Their use in reducing inoculum potential in host tissues and in debris is recommended.

245. Haware, M.P. and Pavgi, M.S. 1969. Field trials with some fungicides and antibiotic aureofungin in control of angular black spot of black gram and green gram. Hindustant Antibiotic Bulletin, 12(1):22-25.

Of the compounds screened against P. patelii on P. mungo and P. radiatus, blitox 50 was most effective at a lower dosage. Other fungicides and aureofungin gave control at a higher dosage.

246. Haware, M.P. and Pavgi, M.S. 1971. Perpetuation of Protomycopsis species causing purple leaf spot of legumes in India. Annals Phytopathological Society of Japan, 37: 242-248.

P. patelii pathogen of P. mungo and P. radiatus was perpetuated through desiccated but viable, heat resistant chlamydospores in host residues which developed into cultures in vitro in soil. The heat resistant mycelium formed more chlamydospores and probably does the same under natural conditions in the soil. Moist heat reduced survival.

247. Haware, M.P. and Pavgi, M.S. 1972. Physiology of chlamydospore germination in Protomycopsis species. Friesia, 10: 43-51.

In P. patelii various acids, alkalies, $KMnO_4$ (1%) and fertilizers induced and hastened chlamydospore germination. External nutrition and light factors were unimportant but germination was favoured by temperature of 25-30°C and pH 3-7.

248. Haware, M.P. and Pavgi, M.S. 1976. Chlamydospore germination in Protomycopsis species. Mycopathologia, 59: 105-111.

Observations on the germination of chlamydospores in P. patelii on P. mungo and P. radiatus are presented. A brief steep in acidified water rendered the thick exosporium permeable and hastened germination. The morphology of stages in the sequence of germination, sporogenesis in the vesicles and post emergence development of endospores were described in detail. The probable consequences of aberrant germination types are discussed.

249. Haware, M.P. and Pavgi, M.S. 1976. Cytology of chlamydospore development in Protomycopsis sp. Cytologia, 41: 459-465.

Observations on the nuclear behaviour during chlamydospre formation by Protomycopsis patelii on P. mungo are described. The vegetative cells and/or conidia from diploid mycelia are pathogenic. Numerous chlamydospres typical of the species from the terminal sporaogenous cells of the permeating hyphae within the infection epicentre. No vascular infection was noted and no haustoria developed. Pathological effects were observed on the host cells without stimulation and enlargement. Comparison was made with chlamydospore development in species of allied genera in the protomycetaceae.

250. Haware, M.P. and Pavgi, M.S. 1976. Field reaction of black gram and green gram to angular black spot. Indian Journal of Agricultural Science, 46:280-282.

When 13 varieties of each of P. mungo and P. aureus were tested in field for resistance to the disease caused by Protomycopsis patelii, only two P. mungo varieties were highly resistant. In P. aureus three were immune, six highly resistant and two moderately susceptible.

251. Haware, M.P. and Pavgi, M.S. 1977. Host range of two Protomycopsis species from India. Sydowia, 29: 272-274.

Of 23 plant species inoculated only P. mungo, P. radiatus and cowpea were susceptible to P. patelii.

252. Haware, M.P. and Pavgi, M.S. 1977. Cytology of chlamydospore germination and in vitro development of Protomycopsis species. Caryologia, 30: 313-331.

Observations are described on nuclear behaviour relative to chlamydospore germination, sporogenesis and chlamydospore development in P. patelii parasite on P. mungo. Taxonomic and Phyllogenetic relationship of the genus and Protomycetaceae are discussed.

253. Hiremath, R.V. and Shambulingappa, K.G. 1981. Macrophomina stem blight of black gram and its effect in some varieties. Current Research, 10(1):11-13.

In 10 V. mungo cultivars sown in plots known to be severely infested with M. phaseoli (M. phaseolina), reduction in the number of pods/plant was 4.1-52.2% (av. 22.9%) and in 100 seed weight 3.5 to 11.4% (av. 7.8%). Incidence was low on 3 cultivars but since these were infected at an early stage, pod reduction was high. The disease is sporadic and may become endemic in some areas.

254. Hoffmaster, D.E., Mc Laughlin, J.H., Ray, W.W. and Chester, K.S. 1943. The problem of dry rot caused by Macrophomina phaseoli (= Sclerotium bataticola). Phytopathology, 33: 1113-1114 (Abstr.)

It is a common economic problem, in south, of several crops and newly recorded on mungbean. It mainly attacks seedlings causing damping off and submature plants, root decay resulting in stem rot precoceous ripening, low yields and premature death. Invasion is favoured by devitalization characteristics of plants subjected to environmental extremes and wounds. It is adapted to high temperature. Single conidia produce invariably the sclerotial stage. A theory that sclerotia may be immature pycnidia is proposed. For control, cultural practices increasing crop health and vigour, liming of soil, increasing organic matter and use of resistant varieties is proposed.

255. Honda, Y. 1986. Mungbean yellow mosaic virus. In International symposium on virus diseases on rice and leguminous crops in the tropics. Tropical Agricultural Research Centre, Japan, No.19:121-128.

This whitefly borne virus on V. radiata in Thailand was transmitted mechanically also. Optimum temp. for symptom expression was 25-30°C. Host range limited to 7 spp. of leguminosae. TIP 40-50°C, DEP 10^{-2} to 10^{-3} and longevity in vitro 1-2 days at 20°C Purified virus was geminate particles 18 x 30 nm with a UV absorption spectrum of nucleoprotein (A 260/A 280 value of 1.3-1.4). Purified virus was infective. In ultrathin sections the particles were isometric 15-20 nm diameter and aggregate almost completely filling the nuclei of infected phloem cells within 2 days of symptoms appearance. Nucleic acid isolated was identified as circular single stranded DNA with a mol. wt. of 8×10^5. MYVM was assigned to the geminivirus group.

256. Honda, Y., Iwaki, M., Thongmeearkom, P., Deema, N. and Srithongchal, W. 1982. Black gram mottle virus occurring on mungbean and soybean in Thailand. JARQ, 16: 72-77.

The virus was isolated from naturally infected mungbean, black gram and soybean and plants in the families Aizoaceae, Amaranthacaae, chenopodiaceae, leguminosae, Pedaliaceae and Solanaceae. It was transmitted by the beetle Monolepta signata and by mechanical inoculation. Its properties include dilution end-point 10^{-9} - 10^{-10}, thermal inactivation point 85-90°C for 10 min and a longevity in vitro of 6-9 weeks at 20°C. Purified preparations had a UV light absorption spectrum typical of nucleoprotein components with a A 260/A 280 value of C. 1.55 and contained isometric particles (diam.C. 28 nm). The virus was serologically identical with BlMV previously reported from India but did not react with antisera against some other beetle transmitted viruses.

257. Honda, Y., Iwaki, M., Thongmeearkom, P, Saito, Y., Kittisak, K. and Deema, N. 1983. Mechanical transmission, purification and some properties of whitefly borne mungbean yellow mosaic virus in Thailand. Plant Disease, 67: 801-804.

The virus was mechanically transmitted between Vigna radiata plants, highest transmission rates being obtained with 0.1 M potassium or sodium phosphate buffer, pH 7.8; optimum incubation temp. for symptoms expression were 25-30°C in the growth chamber or 30°C in day/20°C night in the greenhouse. Host range was limited to 7 plant spp. in the leguminosae among 26 spp. (6 families) tested. TIP was 40-50°C, DEP 10^{-2}-10^{-3} and longevity in vitro 1-2 days at 20°C. Purified virus preparations had a UV light absorption spectrum typical of a nucleoprotein with a A 260/ A 280 value C.1.3-1.4. Purified preparations and leaf dip samples contained geminate particles C. 18 x 30 nm. Infectivity was associated with the presence of purified virus particles.

258. Honda, Y., Iwaki, M., Thongmeearkom, P., Kira-Tiya-Angul, K., Kiratiya-Angul, S., Srithongchai, W., Prommin, M., Kittipakorn, K., Sarindu, N., Deema, N., Syamananda, R., Hibi, T. and Saito, Y. 1986. Mung bean yellow mosaic virus isolated from mungbean in Thailand. Technical Bulletin of the Tropical Agriculture Research Centre, No.21: 189-202.

A more detailed account of studies already reported has been given.

259. Hooda, I. and Grover, R.K. 1982. Studies on different isolates, age and quantity of inoculum of Rhizoctonia bataticola in relation to disease development in mungbean. Indian Phytopathology, 35: 619-620.

Isolates of R. bataticola obtained from different plant species and plant parts of the same host differed in their morphological and cultural characteristics. However, there was no correlation between these characteristics and their pathogenecity on mungbean. Young inoculum (3-5 days old) was more infective than the old one (7-34 days old) and with increase in inoculum density, disease intensity also increased.

260. Hooda, I. and Grover, R.K. 1983. Nutritionally mediated virulence of R. bataticola on mungbean (Vigna radiata). Indian Phytopathology, 36:662-666.

The virulence of R. bataticola (M. phaseolina) inoculum in causing seedling mortality and leaf blight of mungbean was preconditioned by the nutritional status of the substrate medium. Glucose and sucrose as carbon source increased the virulence as well as mycelial growth of the fungus. Asparagine significantly increased virulence. This was also the case when medium was devoid of bivalent metal ions. The addition of Fe^{++} and Mg^{++} individually or in combination with Zn^{++} produced inoculum of low virulence.

261. Hooda, I. and Grover, R.K. 1983. Comparative anti-fungal activity of fungitoxicants against Rhizoctonia bataticola causing seedling rot and foliage blight of mungbean. Indian Journal of Plant Pathology, 1: 75-82.

In vitro test, out of 39 fungicides, carbendazim, benomyl, guazatine, dichlozoline, iprodione and RH 893 were highly toxic to mycelial growth of R. bataticola. Of 6 tested as seed treatment, carbendazim, thiophanate-methyl, cereson and captafol checked seedling mortality of V. radiata. Thiophanate methyl was the most effective soil drench. All except thiram gave more than 90% control of foliage blight when applied as foliar treatment. Guazatine and Captafol were phytotoxic.

262. Hooda, I. and Grover, R.K. 1983. Fungicidal control of Macrophomina phaseolina altered in pathogenicity by substrate nutrients. Annals of Applied Biology, 104: 69-78.

C & N sources and bivalent metal compounds in the medium influence growth, fungicide susceptibility and pathogenicity. Sucrose and asparagine increased mycelial growth as well as pathogenicity of M. phaseolina on mung. Absence of Fe^{++}, Zn^{++} and Mg^{++} produced inoculum causing maximum seedling mortality and foliage blight. Carbendazim and thiophanate methyl were the best fungicides as foliar treatments and controlled the disease irrespective of C, N & bivalent metal ions status of the substrate medium used for the inoculum production.

263. Hooda, I. and Grover, R.K. 1988. Effect of age, quantity of inoculum and isolates of Macrophomina phaseolina on the pathogenesis of mungbean and its control by chemicals. Indian Phytopathology, 41: 107-117.

Four isolates of M. phaseolina differed in their pathogenicity to mungbean in causing seedling mortality and foliage blight. Growth rate and pathogenicity were not correlated. Young inoculum in which sclerotial formation just started (3-5days) was more pathogenic than old (7-34 days old). Carbendazim, Thiophanate-M & captafol (2 g/kg seed) checked seedling mortality caused by young as well as old inocula. All fungicides reduced foliage disease when sprayed but increase in the inoculum quantity lead to high disease incidence and thus required high concentration of fungicides for controlling seedling mortality as well as foliage blight.

264. Hussain, I., Shaikh, M.A.Q. and Khan, A.A. 1981. Field screening of mungbean (Vigna radiata (L.) Wilczek) germplasm for resistance to Cercospora leaf spot in Bangladesh. SABRAO Journal, 13: 180-182.

Out of 130 germplasm, only MB-53 was highly resistant. MB 114 & MB 140 were intermediate. They are being used for breeding resistant varieties.

265. Houston, B.R. 1945. Culture types and pathogenicity of isolates of Corticium solani. Phytopathology, 35: 371-393.

On the basis of the cultural characters and observed pathogenicity, 52 isolates of C. solani were selected from 260 collections on 15 Californian crop plants for further pathogenicity studies including P. mungo.

266. Hussain, S.S. and Ahmad, M.A. 1971. Studies on stored food grains fungi from pulses. Pakistan Journal of Scientific and Industrial Research, 14: 507-511.

Thirty six species were isolated from Cymopsis psoroloides, Phaseolus mungo, P. radiatus, pigeonpea, lentil and chickpea. Of 12 Aspergillus species which formed 60% of the total, A. flavus predominated (24%).

267. Hussaini, S.S. and Seshadri, A.R. 1975. Inter-relationship between Meloidogyne incognita and Rhizobium sp. on mungbean. Indian Journal of Nematodology, 5: 189-199.

Reported Meloidogyne incognita on mungbean. They reduced length and fresh weight of shoot.

268. Hussaini, S.S. and Seshadri, A.R. 1976. Resistance in some mungbean (Vigna radiata) varieties and breeding lines to the root knot nematode, Meloidogyne incognita. Indian Journal of Nematodology, 6:131-137.

Results on screening of mungbean entries against root knot nematode are reported.

269. Ilag, L.L. 1977. Mungbean rust in the Philippines: Symptomatology and etiology. Kalikasan, 6:199-202.

Rust of mungbean is characterised by pinhead cinnamon brown leaf lesions due to uredia of Uromyces vignae. Each lesion is usually surrounded by a yellow halo. Severely infected leaves often dry prematurely and fall.

270. Ilag, L.L. 1977. Fungal diseases of mungban in the Philippines. Proceedings I International Mungbean Symposium, AVRDC, Taiwan: 154-160.

Important symptoms and causal organisms of anthracnose (Colletotrichum lindemuthianum), Cercospora leaf spot (C. canescens, C. cruenta), pod rot (Diplodia sp.), powdery mildew (Erysiphe polygoni), root and stem rots (Rhizoctonia solani, Sclerotium rolfsii, Fusarium spp., Pythium spp.) and rust (Uromyces vignae) are described.

271. Ilag, L.L. and Marfil, V.E. 1977. Diplodia pod rot of mungbean. Philippines Agriculturist, 61:186-191.

A previously un reported disease of V. radiata in the Philippines, characterised by rotting of pods, is caused by D. natalensis (Botryodiplodia theobromae).

Among 10 V. radiata cultivars tested, 3 were moderately resistant, 1 moderately susceptible and the rest susceptible. In inoculation experiment under controlled conditions, the fungus also infected cowpea and Phaseolus vulgaris.

272. Ilias, A.M., Ali, Y. and Saleem, M. 1987. Incorporation of tolerance to mungbean YMV from local germplasm into exotic large seeded mungbean. II International Symposium on Mungbean, Bangkok, Thailand: 26(Abstr.).

Small seeded local variety 6601 (30 g/1000 seed weight) and tolerant to yellow mosaic was crossed with VC 1973-A (70 g/1000 seed wt.). Tolerance to YMV was expressed as monogenic. Got lines having 50-60 g/1000 seed and tolerance to MYMV.

273. Iwaki, M. and Auzay, H. 1977. Virus diseases of mungbean in Indonesia. Proceedings I International mungbean symposium, AVRDC, Taiwan: 169-172.

The virus diseases observed in Indonesia are mungbean yellow mosaic virus, mungbean mosaic virus, urdbean leaf crinkle virus, alfalfa mosaic virus, cucumber mosaic virus, bean common mosaic virus, southern bean mosaic virus and tobacco ring spot virus. Detailed investigations are reported on mungbean mosaic virus and bean yellow mosaic virus.

274. Iwaki, M. 1978. Seed transmission of a cucumber mosaic virus in mungbean (Vigna radiata). Annals of the Phytopathological Society of Japan, 44:337-339.

A strain of the virus (CMV-M) was transmitted in 11% of mungbean cv. M-435 plants & 10% of cowpea cv. Black eye in tests to determine the suitability of mungbean cvs. from Taiwan for cultivation in Japan. Many other mungbean cvs. are not invaded systemically by this strain which should not present a serious threat to their cultivation.

275. Jadhav, M.R. and Sharma, B.L. 1975. Field reaction of urd (P. mungo L.) varieties to yellow mosaic virus. JNKVV Research Journal, 9: 169.

On the basis of % plant infected, 12 urdbean varieties were scored of which Mash 48, Selection 1 and L 35-5 were free. UPAU-2, 338/6 and B-76 had less than 5% plants infected. No.55, Krishna, Khargone and Gwalior-18 had more infected plants.

276. Jaganathan, T., Narayanaswamy, P., Palanisamy, A. and Ranganathan, K. 1974. Studies on the damping off disease of black gram (Phaseolus mungo L.) (Pythium aphanidermatum). Madras Agricultural Journal, 61: 156-159.

The natural incidence of the damping off of the black gram caused by P. aphanidermatum in India is reported. In the host range studies chickpea, Dolichos biflorus, D. lablab, P. aureus and V. sinensis were found to be new hosts for the pathogen.

277. Jain, M.K. and Rewari, R.B. 1977. A report on the infestation of urd (P. mungo) crop by root knot nematode. Indian Journal of Mycology and Plant Pathology, 7: 94.

Meloidgyne incognita infested roots of urd variety MK-18 inoculated with Rhizobium culture. The plants starting drying after about a month of their growth. Roots had galls while in some cases root system was almost deteriorated probably due to high population of nematodes. Varieties Mash 1-1, No.41-43 and Pusa-1 were not affected. Plant heavily infested did not revive but some treated with temik @ 10 kg/ha (10% a.i.) recovered. Nematodes proved to be antagonistic to Rhizobium. Grain yield was not obtained in MK-18 and nitrogen fixation was adversely affected.

278. Jain, N.K. 1970. Studies on Rhizoctonia bataticola (Taub.) Butler causing diseases of urd (Phaseolus mungo L.). M.Sc.(Ag.) Thesis, JNKVV, Jabalpur, 60pp.

R. bataticola was isolated from root, stem, leaf, pod and seed of urd and soil of urd field. The soil isolate was most pathogenic followed by pod and root isolates. All caused pre and post emergence rots of urd variety K-3. All of them could infect leaf and stem also. However, they differed from each other in regards of growth pattern, sclerotia, tolerance to temperature and pH etc. Out of 9 fungicides, vitavax and benlate were more effective in vitro. In vivo tests, vitavax, demosan, benlate and ceresan wet were found promising.

279. Jain, N.K. and Khare, M.N. 1972. Chemical control of Rhizoctonia bataticola causing disease of urd. Mysore Journal of Agriculture Sciences, 6:461-465.

In fungicide screening tests against R. bataticola (Macrophomina phaseolina) on Phaseolus mungo, vitavax, demosan and benlate, each at 0.25% and ceresan wet at 0.1% were the best for seed treatment.

280. Jain, N.K., Khare, M.N. and Sharma, H.C. 1972. Variation among the isolates of Rhizoctonia bataticola from urd plant parts and soil, II. Temperature and pH requirement. JNKVV. Research Journal, 6: 165-166.

Studies on 6 isolates of R. bataticola from P.mungo are reported. The isolates differed in their pH and temperature requirements.

281. Jain, N.K., Khare, M.N. and Sharma, H.C. 1973. Variation among the isolates of R. bataticola from urd plant parts and soil. I. In pathogenicity, morphology and growth pattern. Mysore Journal of Agricultural Sciences, 7: 411-413.

The isolates of R. bataticola from various plant parts of urdbean and soil differed in virulence. The soil isolates proved more pathogenic. The leaf isolates formed the largest sclerotia and the seed and soil isolates, the smallest. The soil isolates had the least amount of growth in almost all media and the pod isolate the most.

282. Jalali, B.L., Khirbat, S.K. and Sangwan, M.S. 1981. Studies on different aspects of disease resistance in pulse crops. III International Symposium on Plant Pathology, IPS, New Delhi, pp-161.

The major diseases of mungbean are Rhizoctonia leaf spot, bacterial blight, yellow mosaic and leaf crinkle. ML 26, ML 9, 11157 & ML 70-10 showed resistance consistently. In addition fifteen lines resistant to Cercospora & Rhizoctonia only and four to YMV have been identified. There was postive correlation between resistance and stomatal size, cuticle thickness, nitrogen and protein gradient. A sharp increase in total soluble sugars in susceptible varieties was pronounced. Variety 11157 & ML 26 resistant to fungal and bacterial infection had high total phenols.

283. Jalali, B.L., Khirbat, S.K., Sangwan, M.S., Khurana, A.L. and Dudeja, S.S. 1981. Interaction of fungicidal treatment and rhizobial inoculation on the growth and development of pulse crops. Indian Phytopathology, 34: 109 (Abstr.).

In field trials, fungicidal treatment did not have any inhibitory inpact on survival of Rhizobium on green gram or chickpea when used as recommended doses. Higher doses had adverse effect on nodulation and growth parameters. Seed treatment with Agrimycine (250 ppm) in green gram increased nodulation, total dry matter and grain weight.

284. Jalali, Indu and Grover, R.K. 1979. Uptake of chloroneb by urdbean & its use as seed treatment for disease control. Indian Phytopathology, 32:564-567.

Chloroneb was absorbed by germinating seeds of V. mungo and moved systemically to growing parts. Maximum accumulation was in the roots followed by stem & leaves in 12 days old seedling. It could control root rot caused by R. bataticola.

285. Jamaluddin, Sinha, R.K., Bilgrami, K.S. and Prasad, T. 1977. Changes in protein content of urd seeds (P. mungo L.) due to fungal flora. Current Science, 46: 461.

Changes in protein content due to fungal flora are discussed. Protein percentage of infected seeds altered slightly during mild fungal activity. Gradual deplition of protein in the seeds was also observed with the increase of the proteinaceous nitrogen. The soluble nitrogen increased which can be attributed to hydrolysis of the seed protein due to fungal activity.

286. Jharia, H.K. 1970. Studies on seed pathology of pulse crop important in Madhya Pradesh. M.Sc.Ag. Thesis, JNKVV, Jabalpur, pp.87.

Seed borne fungi of different pulse crops were recorded. They were Alternaria sp., Aspergillus flavus, A.niger, Curvularia sp., Fusarium sp. and species of Helminthosporium, Rhizoctonia and Rhizopus, Aspergillus ochraceous on mung and urd. In addition Penicillium sp. and Pestalotia sp. on mung and Cephalosporium on urd were also noted. Eurotium sp. could be isolated from urd seed after pretreatment. Out of several fungicides tested, Ceresan wet or benlate were found superior for seed treatment of urd and mung.

287. Jhooty, J.S. and Bains, S.S. 1972. Evaluation of different systemic and non systemic fungicides for the control of damping off of mung (Phaseolus aureus) caused by Rhizoctonia solani. Indian Phytopathology, 25: 509-512.

The dosages required for 50% kill and complete inhibition of mycelial growth of R. solani in vitro were low in case of systemic fungicides as compared with the non systemic fungicides. Inhibition of the mycelial growth of Rhizoctonia in vitro did not always relate with the disease control provided by different fungitoxicants. Brassicol among the non systemic and benomyl from the systemic fungitoxicants effectively controlled the pre and post emergence damping off of mung bean caused by R. solani.

288. Jhooty, J.S. and Bains, S.S. 1976. Modification of the toxicity of benomyl by seed exudates of mung. Indian Journal of Microbiology, 16: 73-75.

Exudates of P. aureus greatly reduced toxicity of benomyl to Fusarium solani f sp. Phaseoli. Of 15 amino acids from the exudates, 7 decreased the toxicity and 2 increased it. Glucose and sucrose increased toxicity.

289. Jhooty, J.S. and Bains, S.S. 1976. Studies on infection cushion formation in Rhizoctonia solani. Indian Phytopathology, 29: 303-304.

On mung hypocotyl, pathogenic isolates formed well developed infection cushion. Not formed by non pathogenic isolates. They were not formed on tap root, few on hypocotyl and maximum on stem region above cotyledonary leaves which was highly susceptible.

290. Jhooty, J.S. and Singh, H. 1972. Stability of benomyl in plants. Phytochemistry, 11:2207-2208.

Unchanged benomyl and its breakdown products were found in mung (P. aureus) seedlings after soil treatment with benomyl. It is suggested that hydrolysis of benomyl to its toxic derivatives in aqueous solution and plant tissues is not as rapid and complete as previously believed.

291. Jindal, J.K. and Patel, P.N. 1981. Variability of Xanthomonads of grain legumes.III. Variation in sensitivity to bacteriophages. Phytopathologische Zeitschrift, 100: 97-110.

Of 51 phages tested against 117 bacterial cultures all were specific to Xanthomonas, none was species specific and none attacked all tested spp. Phages sensitivity could not be used for identification of Xanthomonas in pulses and others. White mutant from V. radiata, cowpea and Ricinus communis behaved like their yellow forms to phages from their natural hosts but were distinguishable from their parent yellow strains by some phages isolates from other hosts.

292. Jindal, J.K. and Patel, P.N. 1984. Variability in Xanthomonas of grain legumes.IV. Variation in bacteriological properties of 83 isolates and pathogenic behaviour of cultural variants. Phytopathologische Zeitschrift, 110: 63-68.

83 isolates of 10 spp. of Xanthomonas could not be differentiated by their bacteriological properties but varied in colony size, mucoidness and pigmentation. Virulence was thought to be related to degree of mucoidness rather than rate of multiplication. White mutants of mungbean and cowpea pathogens inoculated in their respective natural hosts were as virulent as their yellow forms.

293. Jindal, J.K., Patel, P.N. and Khan, A.M. 1981. Variability in Xanthomonads of grain legumes.II. Pathogenic variability in Xanthomonas phaseoli mungbean strain, X. vignicola and X. phaseoli var. Sojense. Phytophathologische Zeitschrift,100:1-9.

Of 45 genotypes of Vigna radiata, 32 were resistant, 6 susceptible and 7 showed differential reactions to 11 isolates of X. (campestris pv.) phaseoli from V. radiata. Six distinct races were determined.when 12 resistant and 23 susceptible cowpea genotypes were inoculated with 11 isolates of X.(campestris pv.) vignicola, 9 of the resistant ones were resistant to all isolates, and the other three differentiated the isolates into 5 races. X.phaseoli var. Sojense showed no pathogenic variability on 15 resistant and 5 susceptible soybean genotypes inoculated with 3 isolates.

294. Jindal, K.K. and Thind, B.S. 1987. Control of Cercospora and bacterial leaf spot of greengram. Indian Journal of Agricultural Sciences, 57:372-375.

Seed treatment with hot water, solar heat, streptocycline + captan or streptocycline + Agallol, reduced diseased seedlings as well as disease intensity caused by X. campestris pv. vignaeradiatae. Seed treatment as above + sprays with fungicides/ antibiotics reduced bacterial spot as well as Cercospora spot & increased yield.

295. Joshi, R.K. 1964. Comparative pathogenicity of two isolates of Rhizoctonia bataticola on Phaseolus aureus. M.Sc.(Ag.) Thesis, College of Agriculture, Jabalpur, India. pp 42.

Two isolates of R. bataticola obtained from infected leaves of mung from Jabalpur (R1) and Chhindwara (R2) were not much different in their pathogenicity. Both the isolates induced rotting of hypocotyl spotting of leaves and reddening of

veins. The infection was more in case of inoculum present in soil as compared to that carried with seed. Other factors which increased the infection were injury given to seed, older culture of the pathogen, deficiency of nitrogen or phosphorus and early seedling stage (10-20 days old). Pathogen penetrated host tissues directly causing necrosis in 96-144 hrs and death of tissues in 168 hrs of infection. The pathogen survived in host tissues. Seed transmission is also possible.

296. Kadian, O.P. 1981. Effect of some chemicals and heat on seed transmission of urdbean leaf crinkle virus. III International Symposium Plant Pathology, IPS, New Delhi : 166-167 (Abstr.).

Six antiviral chemicals, four systemic fungicides (seed dressing), four systemic insecticides at different concentrations, dry heat, wet heat and solar heat were tried as seed treatment for inactivating ULCV in seeds of urdbean cv. Krishna. None of the chemicals and dry heat could check virus without affecting seed viability. However, seed dip in 2-thiouracil or 8-azaguanine 0.05 & 0.1% conc. for 30 min was effective. The best was wet heat treatment at 65°C for 30 min or 70°C for 20 min which did not reduce seed viability. Solar heat exposure (12-4 PM) in May & June after 3-4 hr. soaking in water was also good.

297. Kadian, O.P. 1982. Yield loss in mungbean and urdbean due to leaf crinkle disease. Indian Phytopathology, 35: 642-644.

Losses in grain yield due to leaf crinkle disease at Hissar ranged from 2.12-93.98% in mungbean cv. Varsha and 2.82-95.17% in urd T-9. Pods/plant, seeds/pod & 1000 grain weight was reduced significantly in prebloom infected plant. A direct correlation between the stage of plant growth at

infection time & loss in grain yield was observed. Earlier the infection, greater the losses mainly attributed to reduced number of pods.

298. Kadian, O.P. 1983. Occurrence & incidence of leaf crinkle disease on urdbean and mungbean in Haryana. Haryana Agricultural University Journal of Research, 13: 121-126.

A survey for 1975, 76 and 79 revealed that ULCV was less prevalent in summer than in Kharif. It increased year by year in the state & was more prevalent in northern than in southern regions.

299. Kadian, O.P. 1983. Studies on weed plants as host range of urdbean leaf crinkle virus. Haryana Agricultural University Journal of Research, 13:602-603.

Of 23 weed species tested, 5 became infected by ULCV. Infection was systemic in Convolvulus arvensis and disease incidence on V. mungo was greater in fields where this weed was prevalent than in fields free from it.

300. Kado, C.I. and Lurquin, P.F. 1975. Studies on Agrobacterium tumefaciens. IV. Non replication of the bacterial DNA in mungbean (Phaseolus aureus). Biochemical and Biophysical Research Communications, 64: 175-183.

DNA filter hybridization and DNA solution enrichment reassociation experiments indicated that no A. tumefaciens DNA was replicated in mungbean seedlings under the conditions specified in published report for the uptake, integration and replication of bacterial DNA in higher plants. These results failed to concour with reports that large pieces of DNA of the plant genome of bacterial DNA treated plants is made up of bacterial donor of DNA.

301. Kaiser, W.J. 1970. Rhizoctonia stem canker disease of mungbean (P. aureus) in Iran. Plant Disease Reporter, 54: 246-250.

Damping off and stem canker caused by R. (Corticium) solani reduced mungbean seedling population by 4-57% in experimental plots. Inoculum potential was highest in the top 10 cm of the soil in infested fields and decreased rapidly with depth. No resistance was observed among 40 lines tested.

302. Kaiser, W.J., Danesh, D., Okhovat, M. and Mossahebi, G. H. 1968. Regional Pulse Improvement Project. Diseases of pulse crops (Edible legumes) occurring in Iran. Iranian Journal of Plant Pathology, 4(3): 2-6.

Besides the disease of other pulse legumes, diseases were also noted on P. aureus.

303. Kaiser, W.J. and Mossahebi, G.H. 1974. Natural infection of mungbean by bean common mosaic virus. Phytopathology, 64: 1209-1214.

Reported seed borne nature of bean common mosaic virus in mungbean (8-32%). Symptoms were deformation, puckering, rolling, blistering & mosaic. Yield was reduced 31-75% if infection occurred before pod set. Vectors were Aphis craccivora and Acyrthosiphon pisum and A. sesbaniae. Particles were flexuous, 750 nm long. On the basis of host range, symptoms, transmission, serology & particle morphology it was identified as a strain of BCMV. Two lines of mung were highly resistant.

304. Kaiser, W.J., Mossahebi, G.H. and Okhovat, M. 1970. Occurence, pathogenicity and distribution in soil of Rhizoctnia solani inciting a stem canker disease of mungbean (Phaseolus aureus) in Iran. Iranian Journal of Plant Pathology, 6: 17-25.

A damping off and stem canker of mung bean caused by R. solani reduced plant population by 4-57%. Mortality resulted when hypocotyl lesions enlarged or coalesced to girdle the stem. In glass house tests most isolates of the pathogens from different legumes were highly pathogenic to mungbean.

Susceptibility of the seedling decreased with age. Inoculum potential was highest in the top 10 cm of soil, decreased rapidly with depth and the fungus was not found below 40 cm. No resistance was detected in 40 var. in glass house test.

305. Kaiser, W.J., Khovat, M., Mossahebi, G.H., Danesh, D., Zonuzi, A. and Mojahad, P. 1969. Plant Pathology. In progress report of Regional Pulse Improvement Project, U.S. Department of Agriculture, ARS, US Agency for International Development (1969) No.7: 47-80.

Studies on diseases of pulses including mungbean is reported. On mungbean damping off and stem canker (R. solani) is newly reported from Karaj area in Iran. It caused rotting of seeds and wilting and death of seedlings due to girdling of the stem at ground level. After 9 weeks stand was 14,82 & 79% in control, Dexon-terrachlor and terrachlor seed treatment respectively. Rhizoctol combi was phytotoxic.

Two new virus diseases of mungbean were identified in 1969 (i) alfalfa mosaic (AMV) which had scattered plants in field showing yellow mosaic of foliage as the predominant symptoms (ii) cucumber mosaic (CMV) infected plants were stunted with mosaic, deformation and curling symptoms of foliage. Symptoms produced were similar to those caused by mungbean mosaic (MMV) which is a strain of bean common mosaic virus. Several lines showed resistance to MMV.

306. Kajiwara, R. and Mukelar, A. 1975. Occurrence of mungbean scab in Indonesia. Proceedings Third Congress of Indonesian Phytopathological Society, Bogor, Indonesia, Feb. 22-25.

Occurrence of scab on mungbean reported at Cikemeth and Muara sub station of CRIA in 1973-74. Almost all the varieties were infected.

307. Kajiwara, R. and Mukelar, A. 1976. Mungbean scab caused by Elsinoe in Indonesia. Contribution of centre Research Institute of Agricultura Bogor, No.23: 1-12.

The fungus causing scab was identified as Elsinoe iwatae Kajiwara et Mukelar as a new species. Morphological and cultural characters are described.

308. Kajiwara, T. and Mukelar, A. 1976. Mungbean scab caused by Elsinoe in Indonesia. Biological Abstract, 66:37862.

The disease of P. aureus in Bogor seriously affected leaves, stems & pods of most native cvs. including Indonesian improved. The symptoms and morphology & pathogenicity of the fungus are discussed. The pathogen wasidentified as E. iwatae a new sp.

309. Kamal and Verma, A.K. 1977. Fungal air-spora over urd (Vigna mungo (Roxb.) Linn.) at Gorakhpur as obtained by settle plate method. Proceedings of the National Academy of Sciences, India, B, 47:241-246.

Several fungi were detected from the air over urd bean crop in the field using settle plate method and have been listed.

310. Kamthan, K.P., Gurha, S.N. and Misra, D.P. 1981. Fungicidal control of Cercospora leaf spot of urdbean (Vigna mungo (L.) Hepper). Madras Agricultural Journal, 68: 604-605.

All the 13 fungicides tested controlled C. canescens on urd in field but best results were obtained with bavistin (carbendazim) followed by bordeaux, DZ-78, Brassicol and DM-45.

311. Kannaiyan, S., Venkatarao, A. and Thangamani, G. 1974. Control of Cercospora leaf spot of green gram. Labdev, B, 12: 150-151.

In fungicidal field tests against C. (Mycospharella) cruenta on mungbean, benlate reduced leaf spots considerably and prevented leaf shedding. EL 273, Hinosan, Dithane M-45 and Kocide also significantly reduced leaf spotting but not leaf shedding. All fungicidal treatments increased yield.

312. Kanta, S. 1982. Effect of culture filterate of some fungi on seed germination and on seedlings of Phaseolus mungo. Biological Bulletin of India, 4:78-84.

The culture filterates of Alternaria alternata, Aspergillus flavus, C. lunata, Drechslera halodes & F. oxysporum from 10, 20 & 30 days old cultures reduced percentage germination and root and shoot elongation of old cultivars L 35-5 & T-9. The effect was maximum with boild filterates from a 30 days old culture and with filterate from F.oxysporum. Roots were more sensitive than shoots.

313. Kartha, K.K. 1965 Rhizoctonia disease of mung, factors affecting the incidence and severity of the disease. M.Sc.(Ag.) Thesis, JNKVV., Jabalpur.

Mung plants when artificially infected by R. bataticola exhibited necrotic lesions on cotyledonary and true leaves. Poorly nourished plants were pre disposed to disease more than those receiving nitrogen and phosphorus at N 10, P 20 levels. N and P at equal levels or in excess or if applied in absence of the other counter element, increased the susceptibility of plants to R. bataticola. In culture medium the growth of the pathogen was supported by N P K but it had no correlation with disease incidence. In soil, maximum growth of the pathogen was at 30°C temperature and 15% moisture. At 25°C and 20% moisture no growth was noted. Mercuric chloride at 5000 ppm was effective.

314. Kartha, K.K. and Nema, K.G. 1969. Effect of host nutrition on the incidence and severity of a Rhizoctonia disease of Phaseolus aureus. Indian Phytopathology, 22: 471-475.

In a study on the effect of N, P and K on the infection by R. bataticola (Macrophomina phaseolina) and on the growth of the pathogen, it was observed that differences in nutrition had a marked effect on pathogenicity.

315. Kassanis, B. and MaCfarlane, I. 1964. Transmission of tobacco necrosis virus by zoospores of Olpidium brassicae. Journal of General Microbiology, 36:79-93.

Infection took place after 1 min. exposure of lettuce and P. aureus roots to mixture of TNV strain D and zoospores. Roots washed after 10 min. exposure to zoospores were most readily infected by TNV when it was introduced during the 1st 1-2 h but some infection occured when it was introduced 4 h after washing. Immersing inoculated roots in hot water (60°C) after varying intervals of time, killed the fungus but not the virus and showed that the virus became established after 2-3 hr. Transmission was prevented by adding conc. homologous antiserum to infected zoospores or very dilute antiserium to virus before mixing with zoospores. The effect of antiserum of other TNV strains depended on the degree of serological relationship with strain D.

316. Kataria, H.R. and Grover, R.K. 1975. Inhibition of infection structures of R. solani by fungitoxicants. Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz 82: 226-232.

Mycelial growth was inhibited 50% by PCNB, benomyl, chloroneb and thiophanate-methyl at 1.5, 2, 4 and 65 /u M respectively. Infection cushion formation on cotton threads was inhibited best by benomyl at

2.5 /u M. Higher concentrations were required for the other fungitoxicants. Development of the infection cushion on the hypocotyl of inoculated mungbean was prevented when seedlings were dipped in 250 /u M benomyl or thiophanate-methyl for 30 min , chloroneb at 250 /u M for 2 h, and PCNB at 500 /u M for 4 h. The inhibition of the infection cushion on treated seedlings correlated with the levels of root rot and damping off. Control in pot test with the same fungitoxicants as seed treatments was obtained.

317. Kataria, H.R. and Grover, R.K. 1976. Fungitoxicity of mineral oils against Rhizoctonia solani causing damping off of mungbean (P. aureus). Annals of Applied Biology, 83: 79-85.

The mineral oil BSO, EWOS and E 9267 and one vegetable oil (mustard oil) did not appreciably inhibit mycelial growth of R. solani. However, direct treatment of 100 seeds of mungbean with 2 ml of EWOS and E 9267 oils controlled more than 90% of pre and post emergence damping off and protected seedlings in soil inoculated with R. solani five days after sowing. Soaking seeds in diluted solutions of these oils or drenching the soil did not control damping off. Mustard oil controlled only pre-emergence damping off.

318. Kataria, H.R. and Grover, R.K. 1977. Comparison of fungicides for the control of Rhizoctonia solani causing damping off of mungbean (P. aureus). Annals of Applied Biology, 88: 257-263. (Indian Phyto-Pathology, 30: 151 - Abstr.).

Of 41 fungicides tested in the lab, copper carbonate copper sulphate, mercuric chloride, agrosan GN, Quintozene, Kasugamycin, Carboxiin, pyracarboid, carbendazim, chloroneb, benomyl, ohric, RH 893 and terrazole were most inhibitory to mycelial growth

of R. solani on Czipek's agar plates and had ED 50 values of less than 1 /u g a.i./ml .Of 17 fungicides tested in glasshouse as seed treatment, thiabendazole carbendazim, benomyl, thiophanate-methyl, dacalorzolane and ohric gave 80-90% control of damping off. A single soil drench with thiophanate-methyl and 2 with benomyl gave 90% disease control. More seedlings with R. solani infection survived when thiophanate-methyl was used as a post inoculation soil drench than when benomyl or chloroneb were used.

319. Kaushal, R.P. and Singh, B.M. 1988. Genetics of disease resistance in urdbean (Vigna mungo (L.) Hepper) to the leaf spot caused by Colletotrichum truncatum (Schw.) Andrews & Moore. Euphytica, 37: 279-281.

Out of 48 lines of urdbean 13 were resistant to C 1 isolate of C. truncatum. Genetic analysis showed that P 7, P 27, P 103 and P 115 carried single dominant non allelic resistance genes. P 53 carried 2 genes whose interaction was not clear.

320. Kaushal, R.P. and Singh, B.M. 1988. Inheritance of disease resistance in blackgram (V. mungo) to mung bean yellow mosaic virus. Indian Journal of Agricultural Sciences, 58: 123-124.

The resistance to MYMV in urd varieties Pant U-19 and Pant U-26 was found controlled monogenically . They have two different genes for resistance.

321. Kaushik, C.D., Chand, J.N. and Satyavir, 1981. Investigations on seed borne nature of Rhizoctonia bataticola causing leaf blight of mungbean. In III International Symposium on Plant Pathology, IPS, New Delhi: 87 (Abstr.).

Disease is becoming important in Haryana. Affected leaves fall pre-maturely and seed infection leads to reduction in yield and its quality. In mungbean varieties seed borne infection ranged from 2.2 to 15.8% and external infection was greater than internal. Seed from diseased pods had upto 61.8% infection in which 47% was internal with 23% deep seated in cotyledons. Pathogen survive in seed upto 36 months under lab. conditions. Infection of seed caused 10.8% loss in yield & reduced total soluble sugars, reducing sugars and protein by 7.8, 17.0 & 12.3 %, respectively.

322. Kehri, Harbans Kaur and Chandra Sudhir. 1985. Effect of foliar application of chemicals on Rhizosphere microflora and nodulation of urd (Phaseolus mungo). Indian Phytopathology, 38: 615 (Abstr.).

Maximum fungal population was in Rhizosphere of plants sprayed by 50 ppm sodium nitrate at fruiting stage, Actinomycetes in 50 ppm urea & bacteria in 100 ppm Na_2HPO_4 (100 ppm). Maximum nodules were in sodium nitrate (250 ppm). Potassium chloride, 2,4-D and urea spray had suppressive effect on M.phaseolina also.

323. Kehri, Harbans Kaur and Chandra Sudhir, 1986. Effect of foliar feeding of certain chemicals on the performance of mung (Vigna radiata) under water stress conditions. Indian Phytopathology, 39: 146 (Abstr.).

Under water stress conditions nearly all the fungicidal sprays altered the microbial population in the rhizosphere, rhizoplane and within root. The alteration however, varied with the chemical and their concentrations. Some chemicals improved growth, nodulation and yield. Only 50 ppm of Ammonium sulphate favourably affected growth, nodulation and yield and suppressed the population of Macrophomina phaseolina causing dry root rot in mung.

324. Kernkamp, M.F. and Hemeric, G.A. 1953. The relation of Ascochyta imperfecta to alfalfa seed production in Minnesota. Phytopathology, 43: 378-383.

Among the 19 other species of legumes reacting positively to inoculation with A. imperfecta was P. aureus.

325. Keshwal, R.L. and Saxena, D.R. 1984. Effect of date of sowing and chemical spray on incidence of yellow mosaic of mungbean. Indian Phytopathology, 37:411(Abstr.)

MYMV on mung appeared in M.P. for first time in 1982 April after which it spread in 10 fields untill July 1982. Sowing from March to August did not affect virus infection. Spray of Bavistin was ineffective but Rogor spray checked the disease spread. Losses in yield & grain quality were more when plant was infected early.

326. Keshwal, R.L. and Khare, M.N. 1987. Status of viral and Mycoplasma disease of pulses in Madhya Pradesh. Symposium on Diseases of oilseeds and Pulses and their control. JNKVV, Indore, pp. 29.

Yellow mosaic in mungbean is a limiting factor and reported first in 1982 in M.P. Disease attacks mung, urd and wild mung (P. trilobus). The disease causes much loss in areas where summer crop is grown as a practice.

327. Khandar, R.R., Bhatnagar, M.K. and Rawal, P.P. 1983. Evaluation of some commercial varieties of mungbean (Vigna radiata) against the leaf spot caused by Cercospora canescens. Agricultural Science Digest, India, 3: 182-184.

None of the 29 cultivars screened against the pathogen at Udaipur under artificial and natural conditions was immune, resistant or even moderately resistant. Five varieties (Local, ML-9, Varsha, ML-4 and RRS Pusa) were moderately susceptible but the others were either highly susceptible or susceptible

328. Khandar, R.R., Bhatnagar, M.K. and Rawal, P.P.1985. Cultural conditions affecting growth and sporulation of Cercospora canescens, incitant of mungbean leaf spot and germination of its spores, Indian Journal of Mycology and Plant Pathology, 15: 165.

Pathogen grew better in non synthetic media and sporulated in carrot leaf decoction. Best conditions were temp. 25°C, pH 5.9, carbon source glucose & sucrose. Organic nitrogen was better source. Thiamine and Zn supported good growth. Conidial germination was good in tap/distilled water at 27°C & 6-7 pH in 6 hrs.

329. Khandar, R.R., Bhatnagar, M.K. and Rawal, P.P.1986. Chemical control of mungbean leaf spot incitant (Cercospora canescens Ellis & Martin) under lab. & greenhouse conditions. Pesticides, 20(9):45-48.

Benlate inhibited spore germination best followed by dithane Z-78, blitox, bavistin and daconil 2787. Mycelial growth was checked by benlate, bavistin & difolatan. In glasshouse test on inoculated mungbean plants, benlate, bavistin, blitox and deconil was effective.

330. Khare, M.N. 1974. Seed-borne pathogens their detection and importance in relation to the need of quarantine regulations with special reference to legumes. 61st Indian Science Congress, Nagpur, pp 2 (Abstr.).

In a survey of seed borne fungi of leguminous crops, 13 fungi were detected from mungbean and 11 from urdbean seeds. Role of seed borne fungi in causing diseases at later stages of crop growth was established. Need of interstate or interzonal quarantine is emphasized.

331. Khare, M.N. 1978. Seed borne disease of Kharif pulses, their significance and control. All India Kharif Pulse Workshop, ICAR, pp. 1-9.

Diseases caused by seed borne fungi in case of mungbean and urdbean are reported. Suitable control measures are suggested.

332. Khare, M.N. and Chaubey, U. 1978. Significance, method of detection and control of 5 species of Fusarium associated with mung seeds. Proceedings, National Academy of Science, India: 1 (Abstr.).

Fusarium equiseti, F. moniliforme, F. oxysporum, F. semitectum and F. solani were found associated with mung seeds. They caused seed rot and pre-emergence losses, but F. monilifforme, F. oxysporum and F. solani also caused root rot and wilt. These fungi were intraembryal. The infected seeds had lesser protein than healthy seeds. Out of several available methods, agar plate method with PDA was the best. Modified blotter method with water at pH 6 and modified Czapek's agar were selective for the Fusarium species. Out of 9 fungicides tested as seed dresser, bavistin, agrosan GN and thiram were best in checking seed borne species of Fusarium.

333. Khare, M.N. and Chindhalore, J.L. 1974. Chemical control of mung disease at seedling stage. Annual Workshop on Kharif Pulses, ICAR, New Delhi, pp.3.

In a field trial conducted to examine the efficacy of seed treatment with brassicol + thiram, soil treatment with disyston and Tok E-25 alone and in combination, seed treatment with brassicol +thiram (1:1) @ 2,5 g per kg along with soil treatment with disyston @ 15 kg/ha proved helpful in checking the losses of mung crop due to seed and soil borne pathogens at seedling stage.

334. Khare, M.N., Jain, N.K. and Sharma, H.C. 1970. Variation among the Rhizoctonia batatícola isolates from urdbean plant parts and soil. Phytopathology, 60 : 1298 (Abstr.).

R. batatícola was found associated with root, stem, leaf, pod and seed of urdbean. Six isolates from various plant parts and soil exhibited differences in virulence. The soil isolate proved most pathogenic followed by pod and root isolates. In vitro morphological studies at pH 6.5 and 25°C temp. revealed differences in growth pattern and sclerotia size. They also differed in growth pattern and growth rate on different media. Their growth rate differed at temperature and pH levels also.

335. Khare, M.N. , Mathur, S.B. and Neergaard, P.1977. Seed borne fungi of pulses, their detection, location and importance. XVIII. International Seed Testing Association Congress, Madrid, Spain, Reprint No.80, S VII, pp. 3.

With blackgram and greengram seed 24 and 19 fungi were found associated respectively. Incorporation of PCNB made the medium specific for Macrophomina phaseoli. Detailed investigations were made on the association of Colletotrichum dematium, C. graminearum, C. lindemuthianum, Phoma sp., F. oxysporum, F. equiseti, F. solani, F. moniliforme, F.semitectum, Botryodiplodia theobromae, Macrophomina phaseolina and Ascochyta spp. The role of seed borne pathogens in causing diseases at seedling stage and later stages of plant growth was investigated by Water Agar Seedling Symptom Test and Grow on Test.

336. Khare, M.N., Sharma, H.C., Chand, J.N. and Kumar, S.M. 1970. Efficacy of fungicides in the control of the diseases of Kharif pulses- Mung, urd and cowpea. IV All India Pulse Research Workshop, ICAR, p.3.

Fungicidal seed treatment of mungbean with captan, arasan or demosan resulted in 92.5% emergence as compared to 85% in case of check. In a spray trial, foliar diseases were minimum in case of captan. Zineb, manzate D and Fytolan also reduced the disease incidence. In urdbean, maximum emergence was in seeds treated with TMTD. The foliar diseases were minimum in case of PCNB and Dithane M-45 when used as spray. Diseases were least in case of seed treatment and spray with PCMB.

337. Khare, M.N. and Shree Kumar, K. 1980. Role of rain splash in the transmission of soil born pathogens to phyllosphere of urdbean plants. Indian Phytopathology, 33:152-153 (Abstr.)

Pathogens associated with surface soilware found to play greater role in splashing & causing foliar diseases than those below 5 cm. The propagules of C. dematium, C. lindemuthianum & R. bataticola splashed upto 25 cm. Soil covered with straw checked splashes as well as the disease. Foliar sprays as well as soil application by fungicides reduced phyllosphere fungal flor.

338. Khare, M.N. and Singh, V. 1981. Three seed borne Colletotrichum spp. in urdbean, their detection and pathogenic potential. In III International Symposium on Plant Pathology, IPS, New Delhi pp.87 (Abstr.)

Out of 72 samples from M.P., C lindemuthianum was detected in 7, C. dematium f sp. truncata in 21 and C. graminicola in 27. The maximum pergentage association was 18, 23 & 46%, respectively. All were pathogenic causing seed rot, seedling damage, leaf spot, stem canker & pod blight. 2,4-D blotter method was best for their detection in seed. They were extra - as well as intra- embryonal. Histopathological studies revealed formation of acervuli in space between 2 cotyledons. Filterates from all reduced seed germination. Seed infection resulted in 25%

339. Khatri, H.L., Bhatia, D.S., and Chouhan, J.S. 1971. Brief account of the work done on diseases of Kharif pulse crops at Department of Botany and Plant Pathology, PAU, Ludhiana during 1970-71. All India Pulse Improvement Programme Workshop, Hissar.

Reported urdbean leaf crinkle in Punjab and its transmission by sap, aphid (Aphis craccivora) and leaf hopper (Circulifer tenellus). Disease is characterized by leaf crinkling, reduction in leaf size, witches broom and sterility.

340. Khatri, R.K., Reddy, P.N., Mishra, A.B. and Harne, S.M. 1984. Changes in phenolics, aminoacids and sugar contents in mungbean due to infection by yellow mosaic virus. Indian Phytopathology, 37: 408 (Abstr.).

Infected mungbean leaves contained lower amount of total phenols, orthodihydric phenols, pre aminoacids, total soluble sugars and reducing sugars than the healthy ones. Non reducing sugars were slightly more in infected leaves.

341. Khosala, H.K., Naik, S.L., Mandloi, S.C. and Goray, S.C. 1988. Control of powdery mildew of mung and urd in relation to losses and disease development. Indian Phytopathology, 41: 59-63.

All the fungicides included for spray, checked powdery mildew of mung and urdbean, and increased the yield. Studies suggested that the rate of disease development is a better scale to measure the disease incidence on fungicidal spray/ grain weight. This may help in suggesting the spray to be done at different stages of plant growth. Fungicides included were bavistin, bayleton, calixin, karathane, microsulph. Maximum yield was recorded in case of bavistin 0.1%.

342. Kishore, N., Asthana, A. and Dubey, N.K. 1987. Antifungal activity of rhizome vapours of Aphina carinata against Rhizoctonia solani. Transaction of British Mycological Society, 88: 136-138.

Vapours of aqueous extract of rhizomes were highly effective against R. solani. This oil so isolated from rhizomes was effective at 3000 ppm and it possessed a fungicidal activity and broad fungitoxic spectrum. It was not phytotoxic to seeds of mungbean.

343. Kobayashi, K. and Ui, T. 1977. Wilt inducing antibiotic compounds produced by Cephalosporium gregatum. Physiological Plant Pathology, 11: 55-60.

Five metabolites were obtained from the culture filterate of a clone of C. gregatum, from diseased adzuki beans (P. radiatus var. aurea). Among the compounds (characterised as derivatives of tetronic acid and designated gregatin A, B, C and D). A, C & D produced wilt, death of leaves and vascular browning of adzuki and mungbean cuttings. The results suggested a possible role of gregatin A, C, & D in pathogenesis. A and to a lesser extent C and D, were also inhibitory to a wide range of fungi and bacteria in antibiotic tests.

344. Kolte, S.J. 1971. Studies on the leaf crinkle disease of urdbean (Phaseolus mungo L.). Ph. D. Thesis , U.P. Agricultural University, Pantnagar, pp. 1-64.

Detailed studies on urdbean leaf crinkle in regard of occurance, losses, symptoms, host range, varietal resistance etc. are reported.

345. Kolte, S.J. and Nene, Y.L. 1970. Know the leaf crinkle disease of urd. Indian Farmer's Digest, 3 (11): 6-7.

Leaf crinkle of urdbean was reported to be caused by urdbean leaf crinkle virus (ULCV) from Uttar Pradesh. Symptoms of the disease are described.

346. Kolte, S.J. and Nene, Y.L. 1972. Studies on symptoms and mode of transmission of the leaf crinkle virus of urdbean (Phaseolus mungo). Indhian Phytopathology, 25: 401-404.

Evidence is presented that the disease at present is not wide spread and is caused by mechanically transmissible and seed borne virus. The symptoms are characterised by stunting of the plants and the crinkling of leaves. Affected plants produced very few pods. Natural spread of the disease is slow, possibly due to the absence of an active vector in the region.

347. Kolte, S.J. and Nene, Y.L. 1975. Host range and properties of urdbean leaf crinkle virus. Indian Phytopathology, 28: 430-431.

Only 3 of 52 plant species were susceptible to P. mungo leaf crinkle virus (P. aureus, P. aconitifolius and cowpea). The virus was inactivated after 10 minutes at 60-70°C and by dilution beyond 1 x 10^{-4}. Infectivity was retained after 3 days at room temperature and lost after 9 days at 5°C.

348. Kolte, S.J. and Nene, Y.L. 1979. Urdbean (Vigna mungo) leaf crinkle virus : noteworthy symptoms on host and influence of growth stages on host susceptibility. Tropical grain legume bulletin, 15 :5-8.

Disease is characterised by expansion of leaf lamina accompanied by a lighter green colour before appearance of typical leaf crinkling. It causes considerable malformation of inflorescence & pollen sterility. Yield loss of 62-100% as a result in reduction of number of pods in T-9 variety of urdbean under natural conditions was reported.

349. Kolte, S.J. and Shinde, P.A. 1972. Influence of plant extracts of certain hosts on the growth and sclerotial formation of Macrophomina phaseoli in vitro. Indian Phytopathology, 26: 351-352.

Extract of leaf, root and stem of urid and mung adversely affected growth and sclerotial production by M. phaseolina isolate from sesamum.

350.Konde, B.K., Shinde, D.B. and More, B.B. 1980. Studies on root infecting fungi and Rhizobium of black gram (Vigna mungo (L.) Wilczek). Journal of Maharashtra Agricultural Universities, 5: 222-225.

Reduction in seed germination, total number of nodules and dry weight of plants was greater in inoculations by 1 fungus (any of S. rolfsii, M. phaseolina & F. oxysporum from urd) + Rhizobium than 1 fungus + R. This effect is attributed to interaction between the fungi.

351.Kooner, B.S. and Singh, H. 1980. Control of whitefly and the yellow mosaic virus in green gram with granular insecticides. Journal of Research, Punjab Agricultural University, 17: 268-271.

In field trials, insecticide treatments reduced the incidence of the whitefly transmitted MYMV on mung and increased grain yield. Best results were obtained with aldicarb followed by disulfoton.

352.Kooner, B.S., Singh, H. and Singh, K.B. 1979. Preliminary field screening of varieties of mungbean for comparative resistance to whitefly and the yellow mosaic virus. Journal of Research, Punjab Agricultural University, 16: 169-172.

The reactions of 62 V. radiata cultivars to MYMV and its white fly vector were tested over 2 years.

353.Kooner, B.S., Singh, K., Singh, H. and Singh, K.B. 1977. Field screening of mungbean germplasm against whitefly (Bemicia tabaci) and yellow mosaic. Journal of Research, Punjab Agricultural University, 14:75-76.

Of 504 mungbean lines tested, 11 showed low susceptibility to both, B. tabaci and mungbean yellow mosaic virus.

354.Kore, S.S. and Shirshikar, S.P. 1980. Investigations on bacterial leaf spot disease of urdbean (Phaseolus mungo). Indian Journal of Mycology and Plant Pathology, 10: 142-145.

The disease observed on urd in Parbhani was due to a new strain of X. campestris pv. phaseoli. Host range included Phaseolus vulgaris , Dolichos biflorus, P. lunatus, D. lablab and lentil. Plants of V. mungo could be infected upto an age of 65 days. Variety Krishna was highly resistant while H-70-3 and U-S-131 were resistant.

355.Kotasthane, S.R. and Agrawal, S.C. 1986. Control of foliar diseases of mungbean (Phaseolus aureus) by fungicides. Pesticides, 10(8): 35-36.

Out of 4 fungicides used as spray to control powdery mildew and leaf spot, bavistin was the most promising followed by Benomyl. Yield and 100 seed weight was also higher in these two treatments.

356.Kotashthane, S.R. and Gupta, Om 1985. Economics of systemic and non-systemic fungicides in control of diseases of mung. JNKVV. Research Journal,17:158-160.

Powdery mildew (E. polygoni) and leaf blight (M. phaseolina) of mung were controlled best by seed treatment with bavistin at 0.5 g/kg seed followed by 1 or 2 sprays of bavistin (0.02%) at 30 and 45 days of sowing.

357.Koul, A.K. 1980. Two new hosts of Dactuliophora . Indian Phytopathology, 33: 622.

Leaf spot of mung and soybean caused by D. tarris & D. glycines respectively are described. Both pathogens are new Indian records.

358.Kovalenko, E.D. 1967. Intergeneric specialization of Aschochyta from soybean. Zashch. Rast., Mosk, 12(8):46.

In inoculation tests with monosporic isolate of A. sojaecola from the Ukarine Soviet Far East and Mascow and Voronegh region many legumes were infected including P aureus.

359.Kraft, J.M. 1967. Effects of nutrients and inoculum density on the virulence of Pythium aphanidermatum and P. altimum to mung bean seedlings. Disease Abstract, 27(11)B : 3744-3745.

The virulence of both the Pythium species to P. aureus increased by the addition of nutrients to the inoculum, particularly those supplying N source utilized by the fungus, but the response was evident only when the inoculum density was minimum.

360. Kraft, J.M. and Erwin, D.C. 1967. Stimulation of Pythium aphanidermatum by exudates from mungbean seeds. Phytopathology, 57: 866-868.

The mycelial growth from zoospore of P. aphanidermatum was stimulated to a greater extent by exudates from P. aureus seeds germinated at 12 and 42°C (when more sugar and amino acids were exuded) than from seeds at intermediate temperatures. The exudates increased the virulence of the pathogen to P. aureus.

361. Kraft, J.M, and Erwin, D.C. 1968. Effects of inoculum substrate and density on the virulence of Pythium aphanidermatum to mungbean seedlings. Phytopathology, 58: 1427-1428.

It was observed that a favourable source of N was necessary for infection of mungbean seedlings by P. aphanidermatum at low inoculum density. A model system is developed for such a study.

362. Kripa Shankar and Summanwar, A.S. 1975. Cytopathological studies of yellow mosaic virus disease of mung. Indian Phytopathology, 28: 145 (Abstr.).

Epidermal cells when treated by fluorescent dye, acridine orange, the virus appeared as orange red fluorescing inclusions in the cytoplasm of cells from diseased leaf. Pyronone G, methyl green combination proved superior over other strains for differentiation between virus and nucleus. Accumulation of dark orange staining mass was noticed in the first 2-3 abdominal segments of white flies fed on diseased leaves.

363.Krishnaiah, V.V., Venkateswarlu, P., Prasad, M.M.K.D. and Rao, Y.H. 1978. A new strain of black gram (Vigna mungo (L.) Hepper) resistant to powdery mildew (Erysiphe polygoni). Tropical grain Legume Bulletin, 13/14: 28-29.

The new variety (Culture 17), which was derived from 2 susceptible parents, proved highly resistant in field tests under conditions of natural infection. It also had favourable yield and seed characteristics.

364.Krishnamohan, G.,Gangadharan, K. and Shanmugasundaram, P. 1986. Efficacy of certain fungicides against powdery mildew disease of black gram (Vigna mungo L.). Madras Agricultural Journal, 73: 173-175.

Spray with calixin or bavistin @ 0.1% controlled powdery mildew effectively and increased yield.

365.Kulshreshtha, D.D., Mathur, S.B. and Neergaard,P., 1976. Identification of seed borne species of Colletotrichum. Friesia, 11(2):116-125.

Identification of seed borne species of Colletotrichum has been based on relative size of setae in relation to the conidial mass in acervulii on seeds under sterio binocular and on shape of conidia. Diagnostic characters of C. dematium, C. gloesporioides, C. graminicola, C. lindemuthianum, C. lini, & C. acutatum are described. C. graminicola is reported from urdbean. C. capsici, C. glycines, C. truncatum are treated as synonymus of C. dematium.

366.Kumar, C.S.K.V. 1981. Cylindrocladium scoparium Morg. a new record on black gram seeds. Current SCience, 50: 921-922.

Seeds collected from Tirunelveli district of Tamil Nadu contained several fungi of which C. scoparium is a new record on urdbean in India.

367.Kumar, S.M., Khare, M.N. and Shrivastava, S.K. 1969. Macrophomina leaf spot of urid (Phaseolus mungo) I. Some observations on disease resistance. Mysore Journal of Agricultural Sciences, 3: 472-474.

M. phaseoli on urdbean is newly recorded from India. Of 21 varieties tested against the pathogen, BR-68 and T-29 were resistant, while the rest varied from moderately to highly susceptible.

368.Kush, A.K. 1982. Interactions between symbiosis and root pathogenesis in green gram (Vigna radiata (L.) Wilczek). Plant and Soil, 65: 133-135.

Plants inoculated with Rhizobium & R. bataticola separately or together showed an inverse correlation between symbiosis and root pathogenesis. Microtomy of infected roots showed distortion of the outer layers, a possible explanation for the deterioration in the N fixing system in the presence of root rot fungi.

369.Kwon, S.H. and Oh, J.H. 1981. Sporulation of Cercospora canescens Ellis & Matin in culture. Korean Joural of Plant Protection, 20 : 21-24.

Sporulation was abundant on mungbean leaf decoction oatmeal agar exposed to C 2500 lux of fluorescent light and not in darkness. Conditions for maximum sporulation were not same as for good vegetative growth and pigmentation in vitro. The removal of aerial mycelium by brushing with sterile water enhanced conidial production on oatmeal agar.

370.Lai, M.T., Weinhold, R. and Hancock, J.G. 1968. Permeability changes in Phaseolus aureus associated with infection of Rhizoctonia solani. Phytopathology, 58: 240-245.

Within 14-18 minutes of inoculation with R. solani, hypocotyls of P. aureus showed 100% increased rate of electrolyte leakage, although, the first symptoms did not develop until 20 to 24 hrs. Droplets formed on the lesions surface after 24-28 hrs contained a heat labile, non diagzable substance which increased the permeability of healthy hypocotyl tissues. It was concluded that an increase in cell membrane permeability is an initial response to infection by C. solani.

371. Lana, A.F., Egunjobi, O.A. and Esuruoso, O.F. 1978. Studies of the soil transmission of the Nigerian okra mosaic virus. Acta Phytopathologica Academiae Scientiarum Hungaricae, 13 (3/4): 307-311.

Disease free seedling of V. radiata and Hibiscus esculentus developed symptoms of H. esculentus mosaic virus when grown in a field in which infected plants has been grown or in soil from areas with prior disease incidence. No transmission by nematode and fungi was recorded.

372. Lassim, M.B.M., Chin, H.F. and Abdullah, W.D. 1984. The effects of weathering on mungbean (Vigna radiata (L.) Wilczek) seed quality. Pertanika, 7: 77-81.

Weathering reduced seed yield and quality. The later harvested seeds had a higher incidence of infection by seed borne fungi, especially Fusarium spp. Infection by Aspergillus & Curvularia spp. was also observed. Infection increased after the onset of rainy season.

373. Latham, D.H. 1934. Life history of a Cercospora leaf spot fungus of cowpea. Mycologia, 26 :516-527.

P. aureus is among the hosts of Cercospora cruenta represented in the Bureau of Plant Industry Harbarium.

374. Leach, R. 1932. Report of the Mycologist. Annual Report, Department of Agriculture, Nyasaland, 1931. pp. 47-50.

The undersurface of the leaves of green gram showed dark brown angular, intervenal spot consisting of a velvety growth of a fungus resembling Heterosporium.

375. Lin, M.T., Anjos, J.R.N. and Rios, G.P. 1982. Cowpea severe mosaic virus in five legumes in central Brazil. Plant Disease, 66: 67-70.

Serotype of the virus was detected in some crops including V. radiata var. radiata.

376. Litzenberger, S.C. and Stenvension, J.A. 1957. A preliminary list of Nicaraguan plant diseases. Plant Disease Reporter, Supplement 243: 19.

The list of plant diseases in Nicaragua since 1952 includes E. polygoni on Phaseolus aureus.

377. Liu, H.Y. 1961. Citrus gummosis due to Rhizoctonia sp. Special publication, College of Agriculture, Taiwan University, 10: 161-177.

A Rhizoctonia sp. is responsible for this disease in Taiwan causing symptoms resembling Phytophthora foot rot. Soil-borne contamination also infected groundnut and mungbean seedlings.

378. Liu, H.Y., Holmes, F.O. and Reichmann, M.E. 1969. Satellite tobacco necrosis virus from mungbean. Phytopathology, 59:833-836.

STNV was grown in mungbean seedlings under controlled growth room conditions. The optimum conditions for high virus yields & a suitable isolation and purification procedure was described suited for large scale STNV preparation.

379. Lucose, C., and Singh, R.D. 1983. Absorption and translocation of benomyl in different parts of some plants. Indian Journal of Mycology and Plant Pathology, 13: 326-328.

The rates of translocation and accumulation of this fungicide in host including V. radiata and V. mungo are reported.

380. Madamba, C.P. 1974. The control of plant parasitic nematodes on mungo and other field legumes. In R.G. Davide, Abstracts of nematode research studies in Philippines, National Science Development Board, Manila, Philippines, p. 31.

An increase of 12.4% was obtained in yield of mung bean due to soil fumigation with Vydate @ 4.58 l a.i./ha which controlled Meloidogyne sp.

381. Mahmood, M., Kumar, S. and Prasad, H. 1976. Bavistin, a systemic fungicide, as foliar spray for the control of Cercospora leaf spot of mung and urd. Proceedings Bihar Academy of Agricultural Sciences, 24(2):101-102.

The incidence of Cercospora leaf spot of P. aureus and P. mungo var. radiatus was reduced significantly and the yield increased by 47% in the former by treatment with Bavistin @ half kg /ha /1-3 times at fortnightly intervals.

382. Majid, S. 1953. Annual Reports of the grow more food activities of the Department of Agriculture, Assam 1951-52 and 1952-53, Part II, pp 107.

The most serious disease of matima (P. mungo) and mungma (P. radiatus) beans were Colletotrichum lindemuthianum and Cercospora cruenta, both controlled by Perenox sprays.

383. Majorana, G. 1966. Phaseolus aureus a new local lesion host of two citrus viruses. Annali Faculty of Agriculture, University of Bari, 20: 9.

Primary leaves of P. aureus dusted with celite 535 and inoculated with the above viruses developed dark brown, rounded lesions within 3-4 days.

384. Malhan, I., Tyagi, P.D. and Grower, R.K. 1973. Systemic activity of benomyl in urdbean (Phaseolus mungo L.) Acta. Phytopathologica Academiae Scientiarum Hungaricae, 8:295-300.

Benomyl when used as seed treatment (test organism Rhizoctonia solani), first accumulated within a short time in the seed coat and then in the cotyledons. Later it was found in roots, stems and leaves with maximum accumulation in roots followed by stems and leaves.

385. Malhan, I., Tyagi, P.D. and Grover, R.K. 1975. Physical factors affecting toxicity of Benomyl to Rhizoctonia solani in vitro. Indian Phytopathology, 28: 491-494.

R. Solani from roots of P. mungo is highly sensitive to benomyl. Toxicity is highest at pH 7.6 and 20°C while growth of the fungus in the non-toxic medium is best at pH 6.5 and 30-35°C.

386. Mali, V.R. and Vyanjane, N.T. 1980. Distortion mosaic- a new virus disease of chickpea in India. Current Science, 49: 599-600.

A previously undescribed disease characterised by leaflet mosaic and distortion, growth reduction, delayed flowering, under-developed pods and grains & dwarf root system was observed on chickpea. This virus (CpDMV) was not related serologically to alfalfa mosaic, bean yellow mosaic or CMV. Mungbean and some other hosts behaved as symptomless carriers of the virus.

387. Mallaiah, K.V., Vijayalakshmi, M. and Rao, A.S.1981. New records of some foliar diseases. Indian Phytopathology, 34: 247.

Leaf spot of black gram due to Corynespora cassicola (Berk & Curt) Wei is reported near Nagarjun Nagar. Spots were brown 0.51 cm, roughly circular. Sporulation epiphylous. Isolate was pathogenic on green gram also.

388. Marimuthu, T. 1983. Effect of sulphur containing aminoacids on growth, toxin production of Xanthomonas campestris pv. Phaseoli and leaf blight development in green gram. Indian Phytopathology, 36: 47-51.

Cystine inhibited the growth and toxin production of X. campestris pv. phaseoli. Phaseolus aureus cv. CO 2 moderately resistant to leaf blight, contained larger quantities of cystine than the susceptible CO1 & CO 3 Exogenous application of cystine at 0.05% on susceptible cultivars gave protection against disease development.

389. Marimuthu, T. 1984. Changes in oxidative enzymes of resistant and susceptible varieties of green gram (Vigna radiata (L.) Wilczek) inoculated with Xanthomonas phaseoli. Agricultural Research Journal of Kerala, 22: 100-102.

Inoculation of mungbean with X. phaseoli (X.campestris) pv. phaseoli), revealed that resistance in CO2 is related to increased peroxidase activity.

390. Marimuthu, T. and Kandaswamy, T.K. 1980. Bacterial leaf blight of green gram (Vigna radiata var.aureus) caused by X. phaseoli and reaction of certain varieties to the disease. Madras Agricultural Journal, 67: 413.

The identity of causal agent of a disease of V.radiata characterised by brown dry raised spots on leaf and stem, was confirmed as X. (campestris pv.) phaseoli and pathogenicity confirmed experimentally. Out of 25 lines cv. CO2 was moderately resistant followed by K-851, PLS 292, PLS 278 and PLS 266.

391. Marimuthu, T. and Kandaswamy, T.K. 1980. Permeability alteration in moderately resistant and susceptible variety of green gram infected by Xanthomonas phaseoli. Current Science, 49: 667-668.

Infection by X.phaseoli increased the permeability of the cell membrane. The increase was more in highly susceptible var. CO1 as compared to susceptible CO3 or moderately resistant CO 2.

392. Marimuthu, T. and Kandaswamy, T.K. 1981. Toxin production *in vitro* and *in vivo* by *Xanthomonas phaseoli* (E.F. Smith) Dowson, the incitant of bacterial leaf blight of *Vigna radiata* var. *aureus* (Roxb.). Madras Agricultural Journal, 68:121-123.

Details are given of the production & characterization of a toxic metabolite from *X. phaseoli*. The toxin was inhibitory to all the fungi tested except *Pyricularia oryzae* & caused necrotic brown spots on the leaves of host as well as non host plants.

393. Marimuthu, T. and Kandaswamy, T.K. 1981. Role of soluble sugars in the resistance and/or susceptibility of green gram varieties to bacterial leaf blight caused by *Xanthomonas phaseoli*. Current Science, 50: 643-645.

Pot tests indicated that susceptibility of mung var. CO 1 is due to a high level of reducing sugars and resistance to a low glucose level.

394. Marimuthu, T. and Kandaswamy, T.K. 1983. Changes in the amino nitrogen and amino acids in the mung lines moderately resistant and susceptible to bacterial leaf blight organism. Indian Phytopathology, 36:345-348.

Leaves of the MR *Vigna radiata* cv. CO 2 contained more amino nitrogen than those of the susceptible CO 3 or highly susceptible CO 1. On inoculation with *Xanthomonas campestris* pv. *Vignaeradiatae* CO 2 showed a progressive increase in the level of amino nitrogen while susceptible cultivar showed a reduction. Resistance in CO 2 appears to be related to the proportion of aromatic amino acids in the amino nitrogen pool and the presence of sulphur containing amino acids.

395. Mathur, A.K. and Tyagi, R.N.S. 1983. A new pod rot due to Pythium debaryanum in cowpea, mung & urd . Indian Journal of Mycology and Plant Pathology, 13: 219-220.

The occurrence of this fungus on pods of cowpea, V. aureus & V. mungo constitutes new host record.

396. Mathur, A.K. and Tyagi, R.N.S. 1984. Occurrence of choanophora pod rot on Kharif pulses in Rajasthan. Indian Journal of Mycology and Plant Pathology, 14:152.

C. cucurbitarum was the cause of a serious pod rot of Vigna aconitifolia, V. radiata, V. mungo and cowpea during September.

397. Mathur, R.L., Daftari, L.N. and Jhamaria, S.L. 1971. Effectiveness and economics of fungicidal control of powdery mildew of urd (Phaseolus mungo L.) Rajasthan Journal of Agriculture Sciences, 2: 21-23.

In field trials with 5 fungicides against E.polygoni incidence was reduced most effectively by elosal, followed by thiovit. Yield was maximum with thiovit.

398. Mathur, R.L., Handa, D.K. and Mathur, B.N. 1973. Resistance of varieties of cowpea, green gram and guar to root knot nematodes (M. javanica & M. incognita). Indian Journal of Mycology and Plant Pathology, 3: 182-183.

Mung variety T-44 was immune & Kopergaon & Krishna 11 highly susceptible to Meloidogyne incognita. T● was moderately tolerant. Pusa Baisakhi was susceptible. Observations were based on percentage root galling.

399. Mathur, R.S. 1954. Diseases of pulse crops in Uttar Pradesh (India). Agriculture & Animal Husbandry, 5: 24-28.

Described root rot and Cercospora leaf spot on urd and mung. Cercospora cruenta cause much loss to late maturing varieties & appears in August. Symptoms are described. Spray with 5:5:50 bordeaux mixture alongwith linseed oil checked the disease.

400. Mathur, R.S., Banerjee, A.K. and Bajpai, G.K. 1965. The effect of vector control on yellow mosaic incidence on mungbean in India. Plant Disease Reporter, 49: 166-167.

Control of vector reduced incidence of mungbean yellow mosaic virus on mungbean to a considerable extent.

401. Matsumoto Takashi, 1922. Some experiments with azukibean mosaic. Phytopathology, 19: 295-297.

In Japan, a typical mosaic disease of Azukibeans (Phaseolus radiatus var. aurea) was found. The disease resembled soybean mosaic and spread very fast. Detailed symptoms are described. In leaves, sugar and starch was more in dark area as compared to light area.

402. Mc Carthy, D., Jarvis, B.C. and Thomas, B.N. 1970. Changes in the ribosomes extracted from mung beans infected with a strain of tobacco mosaic virus. Journal of general Virology, 9: 9-17.

The quantity of ribosomes extracted from the hypocotyls of P. aureus was increased by virus infection, but this was not associated with a particular size of ribosome. Presumptive virus messanger RNA is associated with polyribosomes consisting of nine or more monoribosomes.

403. Mc Carthy, D., Lander, D.E., Hawkes, S.P. and Ketteridge, S.W. 1972. Effects of cycloheximide and chloramphenicol on the multiplication of tobacco necrosis virus. Journal of general Virology, 17:91-97.

Hypocotyls of P. aureus grown in the dark were inoculated with infective RNA of TNV strain D from frenchbean leaves, excised segments were transferred to phosphate buffer with or without inhibitors and effectivity of sap from homogenised segments was assayed. The virus was inhibited by cycloheximide but not by chloramphenicol and it is likely that the former inhibits the synthesis of atleas two proteins necessary for multiplication.

404. Mc Rae, W. 1929. New diseases reported during the year 1928 from India. International Bulletin of Plant Protection, 3(2): 21-22.

Macrophomina phaseoli, the pycnidial stage of R. bataticola was discovered on wilted plants of P. mungo and P. radiatus for the first time in Madras Presidency. The genetic connections between two forms of the fungus were established in the culture.

405. Mc Rae, W. 1933. Report of the Imperial Mycologist, Scientific Report. Imperial Institite of Agricultural Research, Pusa, 1931-32: 122-140.

In inoculation tests, Cercospora dolichi isolated from Dolichos lablab infected P. radiatus and P. mungo besides several other hosts.

406. Menancio, D.I. and Ramirez, D.A. 1977. Genetic polymorphism and ontogenetic Isozyme patterns of Cercospora leaf spot resistant and susceptible varieties of two Vigna species. Proceedings First International Mungbean Symposium, AVRDC, Taiwan:149-153.

An ontogenetic study of the enzyme activities of resistant and susceptible varieties of Vigna radiata and Vigna mungo. Possible differences in peroxidase and catalase patterns between the resistant and susceptible varieties and the period in the plant development when these differences occur were found out. Starch gel electrophoresis method was followed.

407. Menancio, D.I. and Ramirez, D.A. 1977. Genetic polymorphism and ontogenetic isozyme patterns of Cercospora leaf spot resistant and susceptible variety of mungbean. Philippine Journal of Crop Science, 2: 197-202.

Varietal differences in isoperoxidase pattern were observed among varieties of Vigna radiata and V. mungo, resistant to Cercospora. P x 4 and P x 5 being associated with resistance. Peroxidase

polymorphism may therefore be used as a selection index for resistance. The selection process should be undertaken during vegetative and pod bearing stages when P x 4 and P x 5 are detectable.

408. Messiaen, C.M. and Beyries, A. 1965. Estimation of the infestation of soil samples by virulent strains of Corticium solani. Application to the study of the effect of organic amendments. Phytiat. Phytopharm., 14: 183-191.

To clay-chalk alluvial soil with low infestation by C. solani or to soil mixed with inoculated soil was added (1) Wheat straw, (2) Wheat straw + NH_4NO_3; (3) Chopped maize plants, and (4) chopped P. aureus plants. Seedling infection was least in soil amended with wheat straw.

409. Mew, I.P.C., Wang, T.C. and Mew, T.W. 1975. Inoculum production and evaluation of mungbean varieties for resistance to Cercospora canescens. Plant Disease Reporter, 59: 397-401.

C. canescens leaf spot is a major disease of mungbean in South East Asia. Sporulation occured on PDA but was best on carrot leaf juice agar. The number of conidia formed between 15 and 20°C was positively correlated with temperature and their formation was promoted by light. When suspensions of 2000 conidia per ml were spread over susceptible varieties at different growth stages lesions severity increased from the flowering stage onwards.

410. Mishra, B. and Dayal, R. 1985. Pesticidal effects on soil mycoflora of Phaseolus aureus. Indian Phytopathology, 38: 600 (Abstr.).

Benlate, bavistin, foltaf & topsin-M at 1 & 2% conc. affected rhizosphere mycoflora of mungbean at various stages of plant growth i.e. upto flowering stage.

411. Mishra, R.P., Khare, M.N. and Chand, J.N. 1971. Sclerotium leaf spot of urd (*Phaseolus mungo* L.). Indian Phytopathology, 24: 609-611.

Symptoms of a new disease, leaf spot caused by *Sclerotium rolfsii* on urdbean are described. In field screening varieties D-6-7/1 , NP-6, BR-68 and No.1766 were found free from the disease.

412. Mishra, S.D. and Prasad, S.K. 1974. Effect of soil amendments on nematodes and crop yields: I. Oilseed cakes, organic matter, inorganic fertilizer and growth regulators on nematodes associated with wheat & their residual effect on mung. Indian Journal of Nematology, 4: 1-19.

413. Misra, R.C., Tripathi, D. and Sahu, R.C. 1978. YMV resistant mungbean for summer cultivation. Indian Journal of Genetics and Plant Breeding, 38: 103-105.

Out of 368 entries, L 24-2 was identified as partially field resistant. Two selections Hyb 12-4 & Hyb 4-3 were resistant developed from crosses between L 24-2 and Pusa Baisakhi.

414. Moghe, S.V. and Utikar, P.G. 1981. Effect of sowing dates on the incidence of powdery mildew disease on green gram (*Vigna radiata*). Indian Journal of Mycology and Plant Pathology, 11: 98-99.

In the field incidence of powdery mildew (*E. polygoni*) was minimum on crop sown in mid August and maximum on those sown in late July. The disease was favoured by weekly maximum temperature range 31.34 to 31.67°C with RH 90% during pod formation stage. There was a slight increase in yield (3.9%) in late sown crop.

415. Moghe, S.V., Utikar, P.G. and More, B.B. 1982. Fungicidal control of powdery mildew (Erysiphe polygoni DC) of green gram (Vigna radiata (L.)Wilczek) Pesticides, 16(8): 10-11.

In a field trial, all the 8 fungicides were effective but sulphur dust and Sulpen-80 gave complete control and increased yield by 172.59 and 141.56%, respectively. The economics of control are tabulated.

416. Mohan, R., Subramanian, C.L. and Marimuthu, T.1980. Control of rust disease of green gram. Macço Agricultural Digest Research Bulletin, 5(6): 14.

In a field trial with 8 fungicides against Uromyces appendiculatus on mungbean, the control was best with calixin at 0.07% followed by Bacor 0.1% and Bayleton 0.02%.

417. Montal, G.C., Nandi, D. and Nandi, B. 1985. Allyl - isothiocyanate as an effective post harvest preservative of seeds. Seed Science and Technology, 13: 529-536.

This essential oil present in mustard seeds, proved to be more effective as a preservative even at 0.1% against fungal infection of crops including urd seed. It is better than propionic acid. In tests on healthy seeds no phytotoxicity was recorded at 0.1% while 0.1% propionic acid was phytotoxic.

418. Moore, E.S. 1931. Internal Boll disease of cotton in South Africa. South Africa Department of Agriculture Science Bulletin, 94: 11-18.

The cause of boll rot, Nematospora gossypii and N. coryli were present with the seeds of varieties of mungbean.

419. Moses, G.T. and Nariani, T.K. 1975. A mosaic disease of Phaseolus atropurpureus. Indian Phytopath.,28:102-103.

The common bean mosaic strain on P. atropurpureus also infected mungbean and urdbean causing systemic mosaic mottling.

420. Mukelar, A. 1977. Mungbean scab in Indonesia. Proceedings, First International Mungbean Symposium, AVRDC, Taiwan,: 161-164.

Scab caused by Elsinoe iwatae Kajiwara and Mukelar is described. The disease occured at Cikeumeuh and Muara substation of CRIA Indonesia and attacked almost all the varieties. Leaf, leaf stalk, stem and pods are attacked. Bavistin and Benlate were effective in controlling the disease. Pathogen is described and reported to attack azuki bean, hyacinth bean and pea.

421. Mukelar, A., Sudjadi, M. and Kajiwara, T. 1976. Chemical control for mungbean scab. Contributions Central Research Institute For Agriculture, Indonesia, No.24: 7.

Topsin-M 70 WP, Bavistin 50 WP and Benlate 50 WP were very effective against Elsinoe iwatae on P. aureus. Four applications decreased infection and increased yields 2.5 times as compared to control.

422. Muller, A.S. and Chupp, C. 1945. The Cercosporae of Venezuela. Bol. Society Venez. Gen. nat.,52(7):35-59.

Cercospora canescens is reported on P. mungo and P. lunatus.

423. Muller, A.S. 1953. A foliar disease of legumes in Central America. FAO Plant Protection Bulletin,6:83-84.

The legume leaf spot caused by Chaetoseptoria wellmanii has been reported on P. mungo besides several other hosts.

424. Muniyappa, V., Rajeshwari, R., Bharathan, N., Reddy, D.V.R. and Nolt, B.L. 1987. Isolation and characterisation of a geminivirus causing yellow mosaic disease of horse gram (Macrotyloma uniforum (Lam.) Verdc.) in India. Journal of Phytopathology,119:81-87.

Yellow mosaic caused by horse gram yellow mosaic virus (HYMV) was not mechanically transmitted. This virus was detected in naturally infected leaves of V. radiata with yellow mosaic symptoms.

425. Muniyappa, V., Setty, B.A.S. and Shivashankar,G.1977. Reaction of Phaseolus species to horsegram yellow mosaic. Indian Journal of Genetics and Plant Breeding, 37: 488-490.

P.aconitifolius, P.acutifolius, P.aureus, P.vulgaris ssp. aboriginens, P.coecinens, P.lunatus, P.multiflorus, P.phyllanthus, P.vulgaris, P.lathyroides has 100% infection by horse gram yellow mosaic virus. P.mungo and P.pilosus Kunth & P.angularis had 80% infection. P.polystachyus L. (60%), P.panduratus, P.bracteatus Nees & Mart (50% each), P.atropurpureus ex DC produced 20% & no infection of P.calcaratus Roxb. & P.trilobus Ait.

426. Munjal, R.L. 1960.A commonly occurring leaf spot disease caused by Myrothecium roridum. Indian Phytopathology, 13: 150-155.

Reported Myrothecium leaf spot of mungbean including soybean and 16 other host plants. Symptoms of disease are described.

427. Murugeshan, S. and Chelliah, S. 1977. Influence of surveying time on the incidence of the vector Bemisia tabaci and yellow mosaic disease of green gram. Madras Agricultural Journal, 64: 128-130.

More population of white flies recorded on 20 days old crop of mungbean & less on 40 days. Similarly, July to December sowings had less population than sowings from March to May which correlated with disease incidence. It may be attributed to high temperature which is favourable to whiteflies.

428. Murugesan, S. and Chelliah, S. 1977. Transmission of green gram yellow mosaic virus by the whitefly Bemisia tabaci (Genn.). Madras Agricultural Journal, 64: 437-441.

Mungbean yellow mosaic virus was transmitted successfully by a single infectious B. tabaci but maximum infection was given by ten flies per test

plant. Maximum infection was obtained when vectors had a pre acquisition starvation period of 3 hours followed by an acquisition feeding period of 24 hrs The incubation period was 8 hrs. A high infection was obtained with a transmission feeding period of 24 hrs. The virus was retained by the vector for a maximum of 4 days. There was no trans-ovam-transmission and the first instar nymphs of the vector did not acquire and transmit the virus.

429. Murugesan, S. and Chelliah, S. 1981. Efficacy of insecticides in the control of Bemisia tabaci(Genn.) a vector of the yellow mosaic virus disease on green gram. Indian Journal of Agricultural Sciences,51: 583-584.

In the field, monocrotophos at 0.25 kg a.i./ha applied 3 times at 10 days intervals from the 15th day after sowing of mung, was the most effective in reducing the number of vectors of MYMV, incidence and symptom severety and in increasing grain yield.

430. Murugesan, S., Chelliah, S. and Murugesan, M. 1977. Production of whitefly vector Bemisia tabaci and yellow mosaic disease incidence in green gram. Madras Agricultural Journal, 64: 22-28.

Whitefly population and the incidence of mungbean yellow mosaic virus on mungbean were higher in crops sown during the summer months. Maximum temperature was positively correlated with B. tabaci population in 20-30 days old crop and with disease incidence in 45 days old crop. Multiple regression technique indicated that partial regression coefficient on maximum temperature alone was important in predicting the whitefly population one week in advance, while partial regression coefficients on maximum temperature, rainfall and whitefly populations were important in predicting disease outbreak.

431. Muthusamy, S. and Ragupathy, N. 1983. Efficacy of fungicides in the control of black gram rust. Madras Agricultural Journal, 70: 345-346.

A single spray of Baycor 200 EC (biloxozol) was highly effective against rust (uromyces appendiculatus) on urdbean giving 98.8% control and marked increase in yield.

432. Muthusamy, S. and Ragupathy, N. 1986. Studies on efficacy of vitavax in the control of black gram rust. Pesticides, 20(1): 29-30.

In the field, 2 vitavax sprays (25 & 45 days after sowing) at 200 g/acre or 1 spray (25 days after sowing) at 300 g/acre effectively controlled the rust of Vigna mungo and increased yield.

433. Nacien, C.C. 1924. Study of Rhizoctonia blight of beans. Philippine Agriculturist, 8: 315-321.

Symptoms of blight caused by Rhizoctonia on P.mungo are described. Certain cultural practices like proper sanitation, planting at a time to avoid rainy season, avoidance of thick planting, use of sterilized soil and rotation of crops are suggested.

434. Nagraj, N.C., Muniyappa, V., Satyan, B.A. and Shivashankar, G. 1981. Resistance to mungbean yellow mosaic virus. Indian Journal of Genetics and Plant Breeding, 41: 423-425.

Out of eighteen Phaseolus species, 12 showed severe infection of MYMV. One moderate infection, two mild infection and 2 did not produce any symptoms. Crosses between P. calcaratus and cultivated mungbean varieties Jawahar 45 & PIMS 3 were successful resulting F-1 hybrids. Species showing no infection were P. calcaratus and P. trilobus.

435. Naik, S.L., Khosla, H.K. and Mandloi, S.C. 1984. Control of powdery mildew of mung and urd in relation to losses and disease development. Indian Phyto-Pathology, 37: 283 (Abstr.).

Bavistin resulted in best disease control and highest yield. Negative correlation was found between yield per plant and disease intensity. The powdery mildew under Malwa conditions appears in seedling stage. Rate of disease development was higher during 20th & 22nd August than that between 23rd August to 3rd September & 4th -15th September. Bavistin reduced rate to a greater extent.

436. Nair, N.G. and Nene, Y.L. 1973. Studies on the yellow mosaic of urdbean (Phaseolus mungo L.) caused by mungbean yellow mosaic virus. II. Virus vector relationship. Indian Journal of Farm Sciences, 1:62-70.

Virus acquisition and inoculation feeding period by Bemisia tabaci was 15 minutes. Starvation before acquisition increased transmission efficacy. The incubation period in the vector was more than 3 hrs. The virus was retained by the vector until its death i.e. 10 days but transmission decreased with the period of retention.

437. Nair, N.G. and Nene, Y.L. 1974. Studies on the yellow mosaic of urdbean (P. mungo) caused by mung bean yellow mosaic virus. III. Factors influencing transmission and symptoms expression. Indian Journal of Farm Sciences, 2: 42-47.

Exposure of seedlings into darkness did not influence percentage transmission of MYMV by Bemisia tabaci. The same was true of inoculation at different stages of growth. Cell sap acidity of urd bean varieties was not related to resistance. Percentage transmission was reduced and the incubation period in seedlings was extended in November-December as compared with July-October.

438. Nair, N.G. and Nene, Y.L. 1974. Studies on the yellow mosaic of urdbean (P.mungo) caused by mungbean yellow mosaic virus. IV. Nature and extent of losses due to infection at various stages of growth. Indian Journal of Farm Sciences, 2: 48-50.

Inoculation of plants upto three weeks old resulted in complete loss of seed yield. Yield of plants inoculated in the 8th week for later did not reduce. Reduction in yield was mainly due to fewer pods per plant as a result of infection and not to fewer seeds per pod. Production of shrunken seed was unaffected by virus infection.

439. Nair, N.G., Nene, Y.L. and Naresh, J.S. 1974. Reaction of certain urdbean varieties to yellow mosaic virus of mungbean. Indian Phytopathology, 27: 256-257.

Two types of symptoms, a yellow mottle and a necrotic mottle were reported and considered that the necrotic mottle is a type of resistant reaction to yellow mosaic virus.

440. Nalampang, A. 1977. Mungbean production in Thailand. Proceedings I International Mungbean Symposium, AVRDC, Taiwan : 12-14.

Because of hot and humid conditions diseases are common especially during rainy season. C.canescens appears to be most serious. Root and collar rots are important in poorly draind soils, while mungbean mottle virus and powderly mildew are noticed but did not cause damage.

441. Narayanaswamy, P. and Jaganathan, T. 1973. Vector transmission of black gram leaf crinkle virus. Madras Agriculture Journal, 60: 651-652.

Experimental transmission of leaf crinkle virus of Phaseolus mungo by B. tabaci varied from 20-60%. The incubation period of the virus in plants was 20-23 days.

442. Narayanaswamy, P. and Jaganathan, T. 1973. Sources of resistance to black gram virus diseases. Madras Agriculture Journal, 60: 1836-1838.

Reaction of black gram types/ varieties to BLCV and Black gram sterility mosaic virus (BSMV) are discussed.

443. Narayanaswamy, P. and Jaganathan, T. 1974. Effects of virus infection on the yield components of black gram. Madras Agriculture Journal, 61: 451-456.

Both black gram mosaic and black gram sterility mosaic reduced height of plants which was positively correlated with loss of grain weight. The weight and length of roots were not altered, but the number and weight of nodules were considerably reduced. There was a notable reduction in pod number and grain weight. A regression equation to predict yield losses based on growth retardation is presented.

444. Narayanaswamy, P. and Jaganathan, T. 1974. Characterization of black gram leaf crinkle virus. Madras Agriculture Journal, 61: 979-982.

Leaf crinkle virus of P. mungo was inactivated at more than 1:5000 dilution, 60°C and after 48 hours at room temperature. The optimum pH was 7.2. The virus reacted especifically with its antiserum. Of the 24 plant species tested, P. aureus was also infected.

445. Narayanaswamy, P. and Jaganathan, T. 1975. Effect of black gram leaf crinkle virus infection on seed set and distribution of virus in seeds. Madras Agriculture Journal, 62: 151-154.

The virus induced pollen sterility of 13.64 - 72.09% depending on the variety of black gram. The virus occured in the plumule, radicle and cotyledons of the germinating seed but not in the seed coat.

446. Narayanaswamy, P. and Jaganathan, T. 1975. Studies on seed transmission of black gram leaf crinkle virus - effect of age of plants at infection. Madras Agriculture Journal, 62: 287-290.

Inoculation of P. mungo plants with leaf crinkle virus showed that the higher rates of infection in young plants induced higher rate of seed transmission. The incubation rate was positively correlated with plant age at the time of inoculation but showed a negative linear relationship with percentage of seed transmission. The protection of young plants against virus infection is discussed.

447. Narayanaswamy, P. and Jaganathan, T. 1975. Seed transmission of black gram leaf crinkle virus. Phytopathologische Zeitschrift, 82: 107-110.

Sap inoculation tests showed that susceptibility of P. mungo plants and percentage of seed transmission decreased with increasing plant age. A high degree of infection of young plants increased seed transmission. The incubation period of the virus was correlated positively with plant age at inoculation and negatively with percentage of seed transmission.

448. Nariani, T.K. 1960. Yellow mosaic of mung (Phaseolus aureus L.). Indian Phytopathology, 13:24-29.

The chief symptoms are bright yellow patches on the leaves interspersed with green areas, slight puckering, seed production is affected. This virus differs in host range from the similar disease described on P. lunatus and Dolichus lablab, that it did not infect.

449. Nariani, T.K. and Kandaswamy, T.K. 1961. Studies on a mosaic disease of cowpea (Vigna sinensis Savi). Indian Phytopathology, 14: 77-82.

A mosaic disease of cowpea upto 50% was recorded. It was transmitted mechanically, by seed as well as by insects A.craccivora, A.gossypi, M.persicae and A.evonymy. This virus, cowpea mosaic virus, was transmitted to several hosts including P. aureus and P. mungo producing systemic mosaic symptoms. It was restricted to family leguminosae.

450. Nath,R., Mathur, S.B. and Neergaard, P. 1970. Seed borne fungi of mung (Phaseolus aureus Roxb.) from India and their significance. Proceedings of International Seed Testing Association, 35:225-241.

Many fungi, all but M. phaseoli being previously unreported as pathogens of P.aureus, were identified from seed washing, inspection of seeds and blotter tests. In infection tests Cercospora kikuchii, C. truncatum and M. roridum caused serious leaf spotting and in soil inoculation tests Botryodiplodia palmarum, F. equiseti and M.phaseolina caused most seed rot and seedling blight. Diporthe phaseolorum var. sojae, F.moniliforme and F. solani reduced germination but M. roridum did not, although it caused a servere collar rot.

451. Natrajan, T. and Bagyaraj, D.J. 1981. Effect of fumigants on seed mycroflora of black gram & field bean. Indian Phytopathology, 34: 512-514.

Ethylene dibromide was morelethal or static on most organisms followed by phosphine. Fumigants have little or no effect on Aspergillus terreus, F.oxysporum, Drechslera turcica & Mucor sp. A.glaucus & A. ochraceus were more sensitive.

452. Natrajan, T. and Bagyaraj, D.J. 1984. Fumigation effect on microflora and viability of black gram and field bean seeds. Pesticides, 18(4): 40-42.

Although all 3 fumigants reduced seed microflora of black gram and field bean, EDC (ethylene dichloride) was more effective against bacteria,

EDB (ethylene dibromide) against fungi and phosphine against actinomycetes. The fumigants also reduced the free fatty acidity and reducing sugar contents. EDC & EDB significantly affected the viability of the seeds but phosphine had no adverse effect on germination.

453. Natrajan, T. and Bagyaraj, D.J. 1985. Microflora associated with some pulse seeds. Agricultural Digest, 5: 197-199.

Seeds of pulses including green gram and black gram carried more micro-organisms externally than internally. Bacteria occurred in large number than fungi & actinomycetes. Aspergilli, gram negative rots and streptomyces predominated.

454. Nattrass, R.M. 1941. Plant disease in Kenya during 1940. East Africa Agriculture Journal, 7(1):57.

During 1940, new disease records were made in Kenya. Elsinoe phaseoli caused serious infection of P. aureus attacking the leaves, stems and pods.

455. Nawaz, R.M.S. and Narayanasamy, P.1983. Chemical control of powdery mildew disease of black gram and green gram. Pesticides, 17(2):23-24, 26.

Best control of E. polygoni on urd and mung was achieved with Bavistin, wettable sulphur, karathene, sulphex and benlate.

456. Nawaz, R.M.S. and Narayanasamy, P.1983. Effect of powdery mildew infection on growth and yield of black gram. Madras Agriculture Journal, 70:179-181.

The effect of infection by E. polygoni on shoot length, root length, nodulation and plant growth of black gram are reported. As disease intensity increased there was considerable change in these growth characters.

457. Nawaz, R.M.S. and Narayanasamy, P.1983. Influence of host nutrition on powdery mildew disease development in black gram. Madras Agriculture Journal, 70: 57-58.

Plants of V. mungo receiving sub optimum nitrogen & high phosphorus (30 kg N + 60 kg P/ha) developed less powdery mildew than those under other regimes.

458. Nawaz, R.M.S. and Narayanasamy, P. 1983. Effect of powdery mildew infection on the nitrogen metabolism of black gram. Madras Agricultural Journal,70:316-318.

Infection of V.mungo by E.polygoni resulting in an everall increase in total nitrogen and free amino acids content in the leaves while the protein content of the seeds decreased with an increase in the intensity of infection.

459. Nawaz, R.M.S. and Narayanasamy, P. 1983. Interaction on powdery mildew and leaf crinkle virus of black gram. Madras Agriculture Journal,70: 487-488.

Infection of black gram by ULCV had no effect on the development of powdery mildew although incidence of the disease was marginally greater in virus infected than in healthy plants.

460. Nelson, R. 1932. Investigations in the mosaic disease of bean (Phaseolus vulgaris L.).Michigan Agriculture Experiment Station Technical Bulletin, 118: 71.

Bean mosaic virus affected P.mungo besides several other hosts belonging to the genus Phaseolus.

461. Nene, Y.L. 1968. A survey of the viral diseases of pulse crops in Uttar Pradesh. First Annual Report FG-In-358, U.P. Agriculture University, pp.1-25.

First described leaf curl disease of urd and mungbean from U.P. and on the basis of symptomatology suggested it of virus origin. Description of other viral diseases particularly yellow mosaic was also given. Symptoms of leaf crinkle of urdbean were described.

462. Nene, Y.L. 1969. A survey of the viral diseases of pulse crops in Uttar Pradesh. II Annual Report FG-In-358, U.P. Agriculture University, pp.1-26.

Described symptoms of yellow mosaic on mungbean & noted its occurrence in several districts of U.P., reported mung varieties resistant to MYMV.

463. Nene, Y.L. 1972. A survey of viral diseases of pulse crops in Uttar Pradesh. Research Bulletin, 4, G.B.Pant University of Agriculture & Technology, Pantnagar, pp.191.

A final report of PL 480 project giving an account of virus diseases of mung and urdbeans besides pigeonpea and cowpea, covering symptoms, transmission, host range, spread, properties, screening for resistance. Losses and control were also described. The viruses include mungbean yellow mosaic virus , urdbean leaf crinkle, mosaic mottle and leaf curl viruses of urd and mungbeans.

464. Nene, Y.L. 1973. Newer methods of controlling yellow mosaic of mung, urd and soybean. Indian Farmers Digest, 6(7): 27-28, 38.

Various methods for control of yellow mosaic of mung and urd bean by use of insecticides, disease resistance and cultural operations have been described.

465. Nene, Y.L. 1973. Viral diseases of some warm weather pulse crops in India. Plant Disease Reporter, 57: 463-467.

Mungbean yellow mosaic virus transmitted by white fly affects several pulses including soybean. Sources of resitance have been located in urd bean and soybean but not in mungbean. An insecticide and mineral oil spray schedule for the control of vector has been worked out. Whitefly is parasitized by Paecilomyces farinosus. Urdbean mosaic mottle, urd leaf crinkle & urdbean leaf curl are mechanically transmitted.

466. Nene, Y.L.1973. Control of Bemisia tabaci Genn., a vector of several plant viruses. Indian Journal of Agricultural Sciences, 43: 433-436.

Mungbean yellow mosaic virus could be acquired from and transmitted to P. mungo by B. tabaci adults after a 15 minutes feeding period. Mineral oil sprays killed the vectors within 1-3 minutes in glass house tests.

467. Nene, Y.L. , Naresh, J.S. and Nair, N.G. 1971. Additional hosts of mungbean yellow mosaic virus. Indian Phytopathology, 24: 415.

Brachiaria ramosa, Eclipta alfa, Xanthium strumarium & Cajanus cajan are the hosts ofMYMV. Cajanus cajan is suspected to be the reservoir for overwintering of virus.

468. Nene, Y.L., Shrivastava, S.K. and Naresh, J.S. 1972. Evaluation of black gram (P. mungo Roxb.) and green gram (P. aureus Roxb.) varieties and germplasm for resistance to yellow mosaic virus of green gram. Indian Journal of Agriculture Sciences, 42:251-254.

Out of 15 varieties of black gram some showed resistant reaction while others had susceptible reaction to MYMV. In green gram such a distinction was not observed. A selection from black gram var. D6-7 was highly resistant.

469. Newton, W. and Peiris, J.W.L. 1953. Virus diseases of plants in Ceylon. FAO Plant Protection Bulletin, 2(2): 17-21.

Mosaic diseases of limabean (Phaseolus lunatus), P. mungo and P. lathyroides were closely associated with pigeonpea yellow mosaic in the north central dry belt.

470. Nigaanova, M.S.1962. The biology of the fungus Ascochyta imperfecta. Uzbek. biol. Zn.6(5):39-44.

Mungbean was not infected by A. imperfecta (Phoma herbarum var. medicaginis) isolated from lucern.

471. Nour, M.A. 1962. Witche's broom and phyllody in some plants in Khartoum province, Sudan. FAO Plant Protection Bulletin, 10(3): 49-56.

Witche's broom phyllody were observed on Phaseolus aureus besides several other hosts.

472. Novacky, A. and Hampton, R.E. 1968. Peroxidase isoenzymes in virus infected plants. Phytopathology, 58: 301-305.

Infection of P. aureus with CMV induced quantitative changes in peroxidase diffcrent from thosginduced by senescence. The responses were host specific and no new peroxidases were induced by infection or senescence.

473. Oblisami, G., Devikasundaram, M., Balaraman, K., Purushothaman, D. and Rangaswamy, G. 1973. Correlation between the presence of sugars and aminoacids in the leaf exudates and the quantities of micro-organisms present in the phyllosphere of healthy and mosaic affected green gram. Madras Agriculture Journal, 60: 481-483.

Fungi and actinomycetes were more in healthy leaves while bacteria and Azotobactor were more on infected leaves. Washings of infected leaves contained more aminoacids and reducing sugars as compared to healthy leaves.

474. Paik, S.B. and Do, E.S. 1967. Fusarium spp. isolated from seed, root and cultivated soil of Phaseolus vi (ri) dissimus and their pathogenecity. Korean Journal of Plant Pathology, 3: 8-12.

F. oxysporum, F. moniliforme, F. solani, F.equiseti, F.semitectum, (F.pallidoraseum) and F. sporotrichoides were detected from these materials collected from Kyung-gi Province. P. viridissimus (green gram) seedling disease incidence was 60% in petridish tests and F. moniliforme caused 7% infection on the seed coat and 2% in cotyledons and embryo.

The pathogenecity of all the fungi was confirmed on seedlings in water-agar test tube methods, but F. oxysporum and F. solani isolated from infected roots were weakly pathogenic in the soil treatment methods.

475.Panda, M. and Sheshadri, A.R. 1979. Effect of initial inoculum level of Rotylenchulus reniformis on different growth attributes of cowpea, mungbean and urd. Indian Journal of Nematology, 9:59-60(Abstr.).

Reported reduction in the growth attributes of crops under study due to infestation by reniform nematode at lower levels also.

476.Pande, A. 1985. Biocontrol characteristics of some moulds. Biovigyanam, 11(1): 14-18.

Culture filterates of 3 spp. of Aspergillus and Trichoderma viride retarded growth of Alternaria alternata, Drechslera sp., Fusarium oxysporum, Rhizoctonia bataticola and Sclerotium rolfsii. The effect of the filterates was proportional to their concentration in PDA. Trichoderma checked pre-emergence death of black gram caused by S.rolfsii under laboratory conditions in pots. The effect was greater when the culture was applied to seeds than when mixed with soil.

477.Pande, P.C. 1985. Effects on growth and photosynthesis of Vigna radiata cv. Pusa Baisakhi in environment containing SO_2 and/or NO_2. Current Science,54:393-394.

The yield reduction (shoot and root weight) was greater in SO_2 alone than in the mixture of polutants. Effects of NO_2 alone were insignificant.

478.Pandher, R.S. and Singh, Gurdip 1981. Studies on physiology, pathogenicity, symptomatology and morphology of Cercospora canescens & C.cruenta of mungbean. III International Symposium on Plant Pathology, IPS, New Delhi pp.162-163.

C. canescens is more prevalent and cause much damage than C. cruenta. Both are different morphologically as well as symptomatologically. Abundant conidia formed at 25-30°C & 100% R.H. No sporulation observed below 96.6% R.H. Maximum conidial germination was at 2% dextrose/tap water & 25°C temperature & 100% RH supplemented by a free film of tap water. Darkness favoured conidial production as well as germination. Phenyl alanine, glutanic acid & arginine induced conidial germination.

479. Pandya, B.P., Singh, D.P. and Sharma, B.L. 1977. Screening of mungbean (V. radiata (L.) Wilczek) germplasm for field resistance to yellow mosaic virus. Tropical Grain Legume Bulletin, 7: 13-14.

Out of 248 lines, only Tarai local was resistant. Twentyone were MR & rest tolerant or susceptible.

480. PANS 1981. Pest control in Tropical Grain Legumes. PANS Mannual No.5, pp.206.

Described fungal, viral and bacterial diseases of legumes including mungbean and black gram. Description includes distribution, economic importance, symptoms, spread and control. All the pathogens are compiled in tabular form.

481. Pant, V., Sheila, Hakim, Singh, S.P. and Saxena, S.K. 1983. Morphometries of root knot nematodes, Meloidogyne incognita as influenced by different pulses. Indian Journal of Mycology and Plant Pathology, 13: 313-318.

All the test pulses including mung & urd were inoculated. Size of female & larval population was more in urd & mung.

482. Park, M. 1934. Report on the work of the Mycological Division, Ceylon Administration Reports. Report of Director of Agriculture for 1933. pp.126-133.

Oidiopsis balsamii on green gram (P. aureus) is one of the new records.

483. Patel, M.K., Kamat, M.N. and Bhide, V.P. 1949. Fungi of Bombay, supplement I. Indian Phytopathology, 2: 142-155.

Reported Erysiphe polygoni DC. on leaves of Phaseolus mungo var. radiata from Poona.

484. Patel, M.K., Kulkarni, Y.S. and Dhande, G.W. 1949. A new Synchytrium on Phaseolus mungo. Current Science, 18: 171.

A very severe disease was noted on urd causing defoliation and is proposed as due to Synchytrium Phaseoli. Patel, Kulkarni & Dhande sp. nov. Symptoms and causal fungus is described.

485. Patel, P.N. and Jindal, J.K. 1970. Bacterial diseases in seed legumes in 1968 and 1969. Fourth Annual Workshop Conference on Pulse Crops, Ludhiana 1970.

During a survey in year 1968-69, two new bacterial diseases referred as bacterial leaf spot and bacterial halo blight were encountered at eight locations in six stages.

486. Patel, P.N. and Jindal, J.K. 1972. Bacterial leaf spot and halo blight diseases of mung bean (Phaseolus aureus) and other legumes in India. Indian Phytopathology, 25: 517-525.

Bacterial leaf spot (X. phaseoli) and halo blight (P. phaseolicola), the later newly recorded for India, on mung are described. The former was seed-borne. Symptoms included brown, dry raised spots on leaf and stem. The host range of the two bacteria are compared and their characteristics are described. Mung variety Jalgaon-781 was highly resistant to X.phaseoli. Halo blight produced water soaked spots surrounded by characteristic chlorotic haloes resembling bean halo blight.

487.Patel, P.N., Jindal, J.K. and Shekhawat, G.S. 1971. Study on bacterial diseases of legumes in India. Second International Symposium of Plant Pathology IPS New Delhi, pp.149 (Abstr.).

Reported X.phaseoli on urdbean from Pantnagar, Delhi, Ludhiana, Jabalpur and Amravati.

488.Patel, P.N., Jindal, J.K. and Singh, D. 1972. Studies on resistance in crops to bacterial diseases in India. IV. Resistance in mung bean (Phaseolus aureus) to Xanthomonas phaseoli. Indian Phytopathology, 25: 526-529.

Out of 2160 lines of mung, 29 were highly resistant and 5 tolerant. In some resistant lines, the young leaves on seedlings showed a strong hypersensitivity reaction but at the seed maturity stage old leaves showed few spots.

489.Patel, S.T., Patel, H.V., Patel, M.C. and Patel,D.J. 1986. Evaluation of certain promising mung bean lines against root knot nematodes. Pulse Crops Newsletter, 6: 53.

Early infection results in stunting, yellowing of plants & drying of leaf margin before flowering and thus complete failure of crop. Thirteen entries were screened against M. incognita & M. javanica separately. None of the entries was resistant to either species of nematodes.

490.Patil, N.K., Adiver, S.S., Hiremath, P.C. and Hegde, R.K. 1987. Assessment of black gram varieties for resistance to powdery mildew and yellow mosaic virus. Current Research, 16(3): 41-42.

Out of 29 varieties of urdbean, 9 were resistant to powdery mildew and 25 to yellow mosaic virus showing no infection. Barabanki local, CoBG-10, DU-1, K 66-188, NP 16 and NP 6 were resistant to both pathogens.

491. Patil, S.D. and Mahabale, T.S. 1964. The genus Synchytrium in Maharashtra. Journal of University of Poona, 26: 67-79.

Reported Synchytrium ajrekari on P. mungo & P. radiatus from Poona and Khandala, respectively.

492. Paul, B., Thapar, V.K. and Singh, R. 1974. Effect of systemic fungitoxicant on ureide metabolism in germinating seeds. Indian Journal of Agriculture Science, 43: 662-666.

In trials with actidione, vitavax and benomyl on seeds of P. aureus and P. mungo, germination, redical growth and allantoinase activity were inhibited. Actidione had the maximum effect.

493. Paul, Y.L. and Kaushal, R.P. 1985. Effect of relative humidity on germination of powdery mildew conidia. Indian Phytopathology, 38:757-758.

Four groups are made. Erysiphe pisi on Vigna mungo belonged to those which were indifferent to any R.H. range.

494. Pavgi, M.S. and Haware, M.P. 1970. Artificial culture of two Protomycopsis spp. from India. Nova. Hedw. 19: 323-328.

The species of Protomycopsis were cultivated on nutrient culture media. Special nutrients are required for development of germinable chlamydospores in vitro.

495. Pavgi, M.S. and Haware, M.P. 1970. Conidial discharge in Protomycopsis thirumalacharii. Pathology et Microbiology, 35: 297-301.

Diploid conidia produced on the mycelia in artificial culture are forcibly expelled and carried away by wind currents to incite foliar infection at sites of their lodging on the leflets.

496.Pavgi, M.S. and Mukhopadhyay, A.N. 1965. Anthracnose of butterfly pea. Phytopathologische Zeitschrift, 53: 167-173.

P.mungo is also a host of Colletotrichum dematium f. sp. clitoriicola which causes leaf spot and pod blotch on Clitoria ternatea.

497.Pavgi, M.S. and Thirumalachar, M.J. 1953. Angular black spot disease of mung beans. Nature, 172:314-315.

An angular leaf spot disease of mung beans near Varanasi, India, caused by a fungus identical to Synchytrium phaseoli was reported. Examination of the type material of the latter showed it to be a species of Protomycopsis with a warty exospore. The fungus is designated P. patelli n. nov.

498.Payak, M.M. 1951. A Synchytrium disease of urdbeans. Current Science, 20: 103-104.

The disease was reported from Poona. Only lower leaves well protected from direct sunlight were infected showing galls on both surfaces. The disease is proposed to be caused by Synchytrium ajrekari Payak & Thirumalachar sp. nov. The symptoms & causal organism are described

499.Pearson, M.N. 1981. A mosaic disease of mung bean in Papua New Guinea. Australian Plant Pathology, 10(2): 31.

A mosaic of mungbean was observed in plants raised from seeds imported from Taiwan. Symptoms include a bright yellow mosaic on young developing leaves, slight leaf curl & reduction in plant size. Disease was transmitted by grafting but not mechanically. Disease appears to be the same as yellow mosaic described in India.

500.Phatak, H.C. 1974. Seed-borne plant viruses-identification and diagnosis in seed health testing. Seed Science and Technology, 2: 3-155.

Detection methods of seed-borne viruses of mung and urd are discussed. Characteristics of viruses are described. The viruses included are mungbean mosaic virus, cucumber mosaic virus- mung bean strain, broad bean mottle virus- black gram strain besides several others.

501. Philip, C.T. 1963. Study of Rhizoctonia disease of mung at Jabalpur. M.Sc.(Ag.) Thesis, JNKVV, Jabalpur, pp.70.

The pathogen of R. bataticola was seed transmitted but caused more damage to mung if inoculated in soil. High soil temperature (30°C) medium soil moisture (40-60%) and pH 5 were optimum for the disease development. On host pycnidial development and spore germination was best at 25-30°C and 100% RH. Asthana and Hawker's medium, 30°C temperature, 75% RH, 5 pH , maltose, lactose as carbon source and KNO_2, KNO_3 and $NaNO_3$ as nitrogen sources were best for the growth. Sclerotia formation was influenced by the depth of the medium, RH and Nitrogen sources of medium.

502. Philip, C.T. , Kartha, K.K., Joshi, R.K. and Nema, K.G. 1969. A Rhizoctonia disease of mung (Phaseolus aureus Roxb.) in Madhya Pradesh, JNKVV Research Journal, 3: 40-43.

The symptoms and etiology of the disease (R. bataticola) are discussed. In pathogenecity test, P. aureus and nine other hosts were infected. Soil factors affecting disease incidence were studied. Infected seeds and pycnidia formed on the roots appear to be source of primary infection in field.

503. Pierce, W.H. 1934. Viruses of the bean. Phyto-pathology, 24: 87-115.

The common bean mosaic virus, yellow bean mosaic virus, alafalfa virus-2, tobacco ring spot virus could infect mungbean.

504. Poehlman, J.M. 1977. What we have learned from the International Mungbean Nurseries. I International Mungbean Symposium, AVRDC, Taiwan, pp.97-100.

Powdery mildew appeared late in Columbia but in Taiwan, it appeared early reducing the yield drastically and sometimes killing the plants. Cercospora leaf spot was reported in South East Asia except Palmira, Columbia. Losses depend on the stage of plants at which they are infected. Anthracnose was reported from Palmira and Columbia. MYMV was most severe in Pakistan and India of South Asia. ML-5, ML-1 & ML-6 were tolerant. An unidentified virus was also reported in 31 out of 74 nurseries. Cucumber mosaic virus - mungbean strain was reported from Columbia. It was transmitted by cowpea aphid and mechanically producing local lesions in resistant but mosaic in susceptible lines. Root knot nematode was observed at Alabama.

505. Prasad, B.J. and Rao, [illegible].N. 1981. Growth responses of Phaseolus aureus plants to petrocoke pollution. Journal of Experimental Botany, 32: 1343-1350.

V. radiata plants were treated with petrocoke dust between 26 and 65 days of plant age. Phytotoxic effects included reductions in root & shoot length and in numbers of leaves, nodules, flowers and pods.

506. Prasad, D.D.K. and Prasad, A.R.K. 1987. Effect of lead and mercury on chlorophyll synthesis in mungbean seedlings. Phytochemistry, 26: 881-883.

Treatment of mungbean seedlings with various concentraions of the heavy metals inhibited -aminalevulinic acid dehydratase activity and decreased total chlorophyll content, suggesting the possible regulatory role of the enzyme in chlorophyll synthesis.

507.Prasad, K.S., Rao, P.R. and Wadia, K.D.R. 1983. Protomycopsis leaf spot of green gram. Indian Phytopathology, 36: 178.

The occurrence of P. phaseoli Ramakr. & Subramaniam on Vigna radiata is a new host record from Andhra Pradesh.

508.Prasad, N., Agrawal, J.P. and Agnihotri, J.P. 1962. The genus Protomycopsis in India. INdian Phytopathology, 15: 24-27.

The occurrence of Protomycopsis on cowpea and Sesbania aculeata is reported from Department of Agriculture, Rajasthan. The taxonomy of the genus is reviewed and it is considered that there are two species, P. phaseoli on Phaseolus radiatus, P.mungo, Crotolaria triquetra and cowpea and Protomycopsis ajmeriensis on S. aculeata and S. aegyptiaca.

509.Prasad, S.K., Chawla, M.L., Kumar, S. and Saxena,H.P. 1971. Root knot nematode Meloidogyne javanica(Troub.) Chitwood, and stem borer, Stomopteryx nertaria Meryrick affecting green gram, Phaseolus aureus. Indian Journal of Entomology, 33: 55-60.

The severity of nematode infestation is more in absence of borer, Nematodes and borers have a greater impact on grain formation than on pod setting and threshold of the nematode index for significant reduction in grain yield was 1.5 in the presence of borers and 3.5 in absence of borers. The treatment with aldicarb @ 0.5 kg a.i./ha increased yield by 3.5 times and the results are a pointer to the likely associations between pest resulting in disease severity and crop losses.

510.Prasad, S.K., Mishra, S.D. and Gaur, A.C. 1972. Effect of soil amendment on nematodes associated with wheat followed by mung and maize. Indian Journal of Entomology, 34: 307-311.

Wheat straw + neem seed cake + NPK and wheat straw + neem seed cake + ½ NPK provided maximum reduction in the population of plant parasitic nematode, Helicotylenchus , Tylencorhynchus and Pratylenchus. These however recorded high number of free living nematodes. The effectiveness of soil amendment could be better evaluated 75 days after treatment.

511. Prasad, T., Bilgrami, K.S., Roy, A.K. and Jamaluddin 1976. Deterioration of mung seeds by Curvularia lunata. Seed Research, 4: 191-193.

Observed marked decline in the sugar concentration in diseased mung seed.

512. Preston, D.A. and Ray, W.W. 1943. Yeast spot of soybean and mungbean caused by Nematospora coryli. Peglion in Oklahoma. Plant Disease Reporter, 27:601-602.

N. coryli was found to infect mungbeans. The pathogen was originally found associated with soybean seeds. It causes sunken pale cream coloured spots on seeds which in severe cases remain small and become shrivelled. This is first time found on mung bean.

513. Provvidenti, R. 1986. Seed transmission of black eye cowpea mosaic virus in Vigna mungo. Plant Disease, 70: 981.

Seed transmission of the virus in V. mungo is newly reported in an accession from Iran.

514. Punam Kumari and Sinha, K.K. 1986. Aflatoxin contamination in mung (V. radiata). Indian Phytopathology, 39: 146 (Abstr.).

Aspergillus flavus group of fungi were dominant in 25 seed samples collected from Bhagalpur. Fifteen samples were naturally contaminated with different components of aflatoxines. Aflatoxin B_1 concentration was upto 2800 ppb. Out of 124 isolates of A.flavus 46 produced Aflatoxin in liquid medium. Only one isolate produced B_1 B_2 & G_1. B_1 elaborated by A.flavus ranged between traces to 8400 ppb.

515. Punam Kumari and Sinha, K.K. 1987. Aflatoxin elaboration in mungbean seeds. Indian Phytopathology, 40: 201-203.

In 25 samples of mungbean seeds, Aspergillus flavus group dominated. Fifteen samples were naturally contaminated with different components of aflatoxin and the concentration of aflatoxin B_1 was upto 2800 ppb. Out of 124 isolates of A. flavus 46 produced aflatoxin in vitro.

516. Purivirojkul, W. and Poehlman, J.M. 1977. Injury in mungbean from natural infection from Cucumber mosaic virus. Crop Science, 17: 654-666.

THe experiment proved that the virus spread by an insect vector but the systemic insecticde only provided slight protection against infection. Infection resulted in 90% of the branch length and 5% of the dry weight of resistant strain.

517. Purivirojkul, W., Sittiyos, P., Hsu, C.H., Poehlman, J.M. and Sehgal, O.P. 1978. Natural infection of mungbean (Vigna radiata) with Cucumber mosaic virus, Plant Disease Reporter, 62: 530-534.

CMV infected plants of V. radiata showed pronounced mosaic, leaf deformitties and occassionally flower abortion and pod distortion. The virus was readily sap transmitted and was seed-borne (0.61%). It was acquired and transmitted by Aphis craccivora during brief probes. Identity of the virus was confirmed by host range, electron microscopy and serological studies.

518. Purkayastha, R.P. 1975. Influence of colchicine on the disease susceptibility of gram seedlings to Fusarium orthoceras. Science & Culture, 41: 546-547.

Seed treatment with 0.25% colchicine increased the susceptibility of Phaseolus mungo grown in soil infested with Macrophomina phaseolina.

519. Quebral, F.C. 1969. Greenhouse test for controlling mungbean powdery mildew by incorporating chemical in the soil. Philippine Phytopathology, 5: 52-54.

Benomyl when mixed in the soil at 0.5, 0.25, 0.15 and 0.07/400 cc of rooting medium provided complete protection against powdery mildew for 70 days.

520. Quebral, F.C. 1977. Powdery mildew and Cercospora leaf spot of mungbean in the philippines. Proceedings Ist International Mungbean Symposium, AVRDC, Taiwan: 147-148.

The powdery mildew can reduce yield as much as 21% when all the leaves are covered with mildew at flowering time. Benomyl spray @ 30 g/100 l twice during the season at 10-14 days interval effectively controlled the disease. When applied in soil, it gave complete protection for 70 days. Several mung bean germplasm types were found resistant to powdery mildew. Cercospora leaf spot reduces yield by 23% when 75% foliage is killed. Benomyl 30 g/100 l water is effective when applied twice at 10 days interval. Cercospora spores were more in day and decreased at night. CES 1D-21 (Pagasa) is highly resistant to powdery mildew and MR to Cercospora leaf spot.

521. Quebral, F.C. and Cagampang, I.C. 1970. Influence of Cercospora leaf spot control on yield of mung bean. Agriculture at Los Banos, 9(4): 4,7,12.

Mungbean yield is reduced due to Cercospora leaf spot by 23% when 75% of the foliage is killed.

522. Quebral, F.C. and Lantican, R.M. 1969. Effect of Benlate on powdery mildew and yield of mungbean. Agriculture at Ls Banos, 9(1): 13-14.

Powdery mildew can reduce yield as much as 21% when all the leaves are covered with mildew colonies at flowering time.

523. Quimio, T.H. 1975. Anthracnose organisms and diseases of Philippines crops. Technical Report No.30, U.P. Natural Science Research Centre, Diliman, Metro Manila.

Anthracnose of mungbean is caused by Colletotrichum lindemuthianum (Sacc & Mgn) Bri & Cav. The fungus forms saucer shaped erumpent acervuli. Filiform setae are present, 2 to 4 septate, 3.5-12 /u. Conidia are cylindrical or ellipsoidal, hyaline, non septate and measure 3-6 /u x 10-20 /u. When present in mass they form pink or orange slimy drops.

524. Rachie, K.O. 1974. Grain legumes of the low land tropics: Mungbean. In K.O. Rachie & L.M. Roberts. Advancement in Agronomy, 26: 62-77.

Resistance to various diseases is mentioned in mung bean varieties: Macrophomina leaf spot: BR 68 & T 29. Viruses: M 101, 238, 330, 118, 221, 174, 235 in USA and T-65 & T-67 in India. Downy mildew: M 229, 243, 210, 319, 330, 358, 366. Powdery mildew: M 81, 183, 90, 238, 4, 195, 409 in USA. Sclarotium leaf spot : 4 resistant & 11 Moderately susceptible in India. Halo blight: Peruvian sources were resistant in Ohio. Cyst nematode: Jumbo was resistant to Heterodera glycines.

525. Raghunathan, V. 1968. Damping off of green gram, cauliflower, dhaincha, ragi and clusterbean. Indian Phytopathology, 21: 456-457.

Damping off caused by Pythium indicum (P. deliense) on Phaseolus aureus is observed along with other causal organisms on other hosts.

526. Raghunathan, V. 1970. Root rot of Arachis hypogea seedlings caused by Pythium debaryanum. Current Science, 39: 44.

Pythium debaryanum causing root rot of ground nut also infected Phaseolus mungo.

527. Rajak, R.C. and Rai, M.K. 1982. Species of Phoma from legumes. Indian Phytopathology, 35:609-612.

Diagnostic characters of 6 species of Phoma isolated from leguminous plants are described. It included Phoma medicaginis var. pinodella (Jones) Bocrema et al. from living leaves of Phaseolus radiatus L. as a new host record. The fungal characters were described in detail.

528. Rajgopalan, K., Rao, M.A., Seshadri, B.T. and Krishna, B.A. 1981. Studies on seed transmission of Dolichos enetion mosaic virus in certain legumes. Madras Agriculture Journal, 68: 129-130.

The seeds collected from virosed plants exhibited less germination by 4-26% in most varieties of urd, mung, soybean, cowpea & field bean (D. lablab). However, the small deformed seeds from infected plants recorded poor to less germination. It is concluded that the DEMV is not seed borne in its orginal host as well as four other legumes tested. Clusterbean is the local lesion host of DEMV.

529. Rajkumar and Mukhopadhyay, A.N. 1987. Field evaluation of urdbean germplasm lines against Colletotrichum capsici. Indian Journal of Mycology & Plant Pathology, 17: 66.

Out of 82 germplasm lines screened at Shillong under artificially inoculated conditions, T-65, UPU 79-2-4 were highly resistant; UG 201, PDU-3, PDU-10, PDU-8, PDU-2, UPU 80-5-5 were resistant and 27 lines were MR.

530. Ram, R.S., Chenulu, V.V. and Sastry, L.V.S. 1984. Metabolic changes in black gram infected with MYMV. Indian Phytopathology, 37: 88-92.

MYMV infection in blackgram reduced total dry matter, chlorophylls, carotenoids in leaf tissues of resistant (S-1) as well as susceptible (Krishna) varieties. Chlorophyll reduced with the increasing disease severty and was due to reduced activity of chlorophyllase.

531. Ramachandran, P. and Chenulu, V.V. 1985. Seed health testing for seed borne viruses- an urgent need. Indian Journal of Plant Pathology, 3: 33-37.

Since 1979 germplasm of mungbean and other crops has been tested under controlled conditions inside field cages, using morphological, growing on, indicator-inoculation and serological methods. Mosaic diseases on V. radiata were encountered for the first time in India. A combination of methods for testing for seed borne viruses is suggested for adoption in plant quarantine labs.,

532. Ramakrishnan, G., Kandaswamy, T.K., Damodaran, A.P.S. and Ayyavoo, R. 1973. Studies on new mosaic viruses occurring on Phaseolus aureus Roxb. Madras Agriculture Journal, 60: 465-468.

Four virus isolates causing mosaic mottling in P. aureus were transmissible by sap and by aphids and were serologically related to one ahother but not to other virus tested. On the basis of their properties the virus is considered to benew and is named greengram mosaic virus.

533. Ramakrishnan, G., Ranganathan, K., Murugesan, S., Damodaran, A.P.S., Janaki, I.P. and Ayyavoo, R.1973. Studies on mosaic disease of black gram (Phaseolus mungo L.). Madras Agriculture Journal, 60:469-471.

Five virus isolates causing the disease in different areas were found to be sap transmissible. Two of them were also transmitted by Myzus persicae and one by Aphis craccivora. Physical properties and host range are compared. The isolates differed from a mosaic virus previously reported on P. mungo.

534. Ramakrishnan, G., Rangaraju, R., Thangamani, G., Sarojini, D.A. and Kandaswamy, T.K. 1969. Studies on a new mosaic disease of Phaseolus aureus L. Madras Agriculture Journal, 56: 378-380.

Eight species were successfully sap inoculated with the virus; three aphid species did not transmit. In sap from inoculated Chenopodium amaranticolor the virus has dilution end point of more than 1:10x6, longevity in vitro of more than 4 days at 5°C and TIP 90°C. The virus is tentatively identified as a strain of tobacco mosaic virus.

535. Ramanujam, S. 1977. Grain legumes in India. Vienna, Austria International Atomic Energy Agency, pp.187.

Reported Phaseolus aureus selection 293-1-1 and P. sublobatus having resistance to MYMV.

536. Ramaraj, B. and Shanmugam, N. 1986. Growth responses of vesicular arbuscular mycorrhyzae on pulses. Madras Agriculture Journal, 73: 32-35.

Inoculation of soil or seed with Glomus etunicatum increased the growth of black gram and green gram in pot trials. G. fasciculatum and G. mosscae were also effective. Placement of inoculum below the seed was more effective than mixing with top soil or as seed treatment.

537. Ramarao, M.A. and Rajgopalan, K. 1987. Influence of Dolichos enation mosaic virus infection on pod characters and yield in different varieties of black gram and green gram. Journal of Research, APAU, 15: 66-68.

Infection by DEMV reduced 31.6-64.3% yield in 8 cultivars of blackgram and 19.2 -79.7% in 6 cultivars of green gram. Yield reduction was due to reduction in flowers and pods/plant and seeds/pod.

538. Ranganathan, K., Jagannathan, T., Palaniswamy, A. and Narayanaswamy, P. 1973. Rhizoctonia root rot on black gram, lablab and frenchbean. Madras Agriculure Journal, 60: 588.

The isolates of Rhizoctonia solani differed from earlier isolates in sclerotial size, their number and pathogenicity.

539. Rangaswamy, G. and Prasad, N.N. 1959. A new seedling blight of Phaseolus aureus Roxb. and P. mungo L. Indian Phytopathology, 12: 184-185.

A severe seedling blight of urd & mung was reported due to Phomopsis sp. from Annamalainagar. The symptoms appear as water soaked greyish discolouration of the leaf tips. As the disease advances the leaf droops & within 24-48 hrs it may cause wilting. The spots are formed on petiole & stem and are elongated & dark brown in colour. The fungus has been described in detail and is able to infect D. lablab & Raphanus sativus L. causing localised leaf spots.

540. Rangaswamy, G. and Gowda, S. 1963. Some bacterial diseases of ornamentals and vegetables in Madras State. Indian Phytopathology, 16: 74-85.

During 1961-62 a bacterial leaf spot of P. mungo caused by X. phaseoli was observed in the field. On artifical inoculation it could infect P. radiatus & certain other leguminous hosts.

541. Rani, N. and Parashar, R.D. 1981. Studies on nitrogen metabolism in mung as affected by bacterial leaf spot. Haryana Agricultural University Journal of Research.

Nitrogen content of healthy leaves of V. radiata cv. Jawahar 45, susceptible to X. (campestris pv.) phaseoli was higher than in ML 8 and Jalgoan 781 (moderately resistant and resistant respectively). Thirteen, 11 & 8 free aminoacids were detected in the three varieties, respectively. Total nitrogen and free aminoacids decreased with disease development in J-45 and ML-8; Jalgoan 781 remained symptomless.

542. Rao, A.V., Ramadoss, N. and Kannaiyan, S. 1976. Effect of certain fungicides on the control of powdery mildew disease of black gram. Annamalai University Agriculture Research Journal, 6:113-115.

In a field trial, benlate, EL 273 and wettable sulphur controlled Oidium sp. on blackgram and increased yield.

543. Rao, M.A. 1973. Studies on two additional hosts (black gram & green gram) for Dolichos enation mosaic virus (DEMV). Thesis S.V. Agriculture College, Tirupati, pp.72.

All the nine varieties of black gram and 16 of green gram were susceptible to DEMV. The disease syndrom was more marked in winter than in summer. The nodules from infected plants had virus and the infection recorded slight increase in the nitrogen content as compared to healthy plants. In the infected plants, flowering was delayed and only few were formed. Severe reduction in yield was noted. Black gram variety Mash-69 and green gram Pusa Baisakhi were tolerant. The virus was not seed-borne.

544. Rao, M.A. and Rajgopalan, K. 1984. Rare phenomenon of abnormal elongation of inflorescence in green gram (Phaseolus aureus Roxb.) varieties infected by Dolichos enation mosaic virus. Current Science, 53: 546-547.

All 16 varieties of mungbean showed the previously unreported phenomenon following infection by DEMV. Flowering was delayed by 4-10 days but no pollen sterility was observed.

545. Rao, P.B. and Mallaiah, K.V. 1985. Factors affecting conidial germination in Cercospora canescens pathogenic to black gram. Indian Phytopathology, 38: 559-560.

The most favourable conditions for germination of this leaf spot pathogen included temperature 10-35°C (optimum 25°C), RH 96%, white light and pH 5-7.

546. Rao, P.B. and Mallaiah, K.V. 1987. Viability of Cercospora canescens conidia under simulated air-borne conditions. Current Science, 56:1070-1071.

Conidia of C. canescens from urdbean lost viability within 6 hrs in simulated airborne conditions. They are thin walled, filiform & hyaline and these features probably account for the rapid loss of viability.

547. Rao, P.G. and Raghunatha, R.N. 1955. Preliminary observations on the control of powdery mildew in black gram and green gram. Andhra Agriculture Journal, 2: 311.

Powdery mildew of green gram and black gram caused by E. polygoni was controlled by using fungicidal spray.

548. Rao, V.G. 1965. Alternaria tenuis Auct in Bomaby, Maharashtra. Mycopathologia et Mycologea Applicata, 27: 157-163.

Reported A. teneuis Auct on Phaseolus radiatus.

549. Rao, V.G. 1965. The genus Phyllostacta in India. Sydowia, 19: 117-120.

Reported Phyllosticta phaseolina Sacc. on leaves of Phaseolus mungo var. radiatus.

550. Rashid, A.Q.M.B., Barma, A.C. and Shaikh, M.A.Q.1983. Seed borne fungi of mungbean & their pathogenicity. Bangladesh Journal of Botany, 12: 223-224.

Alternaria tenuis (A. alternata), Colletotrichum dematium, Curvularia lunata (Cochlibolus lunatus), Fusarium equiseti, F. semitectum, Macrophomina phaseolina were detected in 15 seed samples of five cv. of Vigna radiata examined. C. lunatus was more prevalent followed by F. equiseti.

551. Rath, G.C. and Grewal, J.S. 1973. A note on Cercospora leaf spot of Phaseolus aureus. Indian Journal of Mycology & Plant Pathology, 3: 204-207.

Effect of leaf age on severity of C. canescens and that of light , R.H. and temperature on sporulation are given. Several promising lines with good resistance were identified which may be employed in breeding for disease resistance.

552. Rath, G.C. and Mishra, D. 1975. Varietal reaction of Phaseolus aureus to Sclerotium rolfsii. Indian Journal of Mycology & Plant Pathology, 5: 216.

In pot experiments with 20 cultivars of P. aureus only No.305 showed resistance. Pusa Baisakhi,L-24-2, PS-16 & N-412 were moderately resistant with 11-30% death.

553. Rath, G.C. and Routray, G.N. 1978. Internally seed transmitted diseases of mung and urd. Science and Culture, 44: 40-41.

The results revealed that the internal mold content of urd was more than of mung. In all Alternaria tenuis Auct., M. phaseoli, F. equiseti, C.truncatum were detected which are known to incite seed rot and seedling blight of urd and mung. Transmission of A. tenuis in urd seed is a new record.

554. Rathi, Y.P.S. and Nene, Y.L. 1974. Two additional hosts of mungbean yellow mosaic virus. Indian Phytopathology, 27: 429-430.

The host range of MYMV is restricted to leguminosae, compositae and gramineae and only one variety of frenchbean out of 29 tested, viz. Manitou is a host of MYMV.

555. Rathi, Y.P.S. and Nene, Y.L. 1974. SOme aspects of the relationship between mungbean yellow mosaic virus and its vector Bemisia tabaci. Indian Phytopathology, 27: 459-462.

The virus persisted in female and male adults of B. tabaci for a maximum of 10 and 3 days, respectively. Transovarial transmission was not observed. The nymphal stage can acquire the virus. Adults could acquire the virus from inoculated Mahallupalam-1 urdbean plants 1-3 days before symptoms appearance. The virus appears to be of a circulative type.

556. Rathi, Y.P.S. and Nene, Y.L. 1975. Sex of Bemisia tabaci Genn. in relation to the transmission of mung bean yellow mosaic virus. Acta.Botanica Indica, 2: 74-76.

557. Rathi, Y.P.S. and Nene, Y.L. 1976. Influence of different host combinations on virus vector relation of mungbean yellow mosaic virus. Pantnagar Journal of Research, 1: 107-111.

The minimum acquisition and inoculation periods of Bemisia tabaci to become infective were 15 to more than 60 minutes and 10 to more than 60 minutes, respectively. The adults required longer acquisition period and inoculation period to infect soybean and T-21 pigeonpea than P. mungo and P. aureus.

558. Raut, S.P. 1980. Effect of initial inoculum level of Meloidogyne incognita on plant growth & Rhizobial nodulation of mungbean. Indian Phytopathology, 33: 351-353.

Mungbean plants inoculated with M. incognita gradually reduced in growth with increasing initial inoculum. It also reduced Rhizobial nodulation.

559. Rawla, G.S., Rewal, H.S. and Chahal, S.S. 1977. Organic growth factors and trace elements for Cercospora dolichi and their gross effects on growth. Indian Phytopathology, 30: 189-194.

The fungus isolated from P. mungo required thiamine Hcl (1-100 ppm) pyridoxin Hcl (100 ppm) and D+biotin (5-10 ppm) partially and Fe (0.01-0.1 ppm) Zn (0.1-1), Mn (0.01-0.1 ppm), Cu (0.01-1 ppm) and B (0.0001 ppm) for maximum growth. Zn & Cu at 100 ppm were highly toxic. The gross effect of organic growth factors and trace elements on morphological and cultural characters varies with respect to mycilial dry weight, physical aspects, morphological & histopathological features such as sporulation, pigmentation and vacuolization.

560. Rayan, G.F., Greenblatt, G. and Dolaimy, K. 1961. Seedling albinism induced by an extract of Alternaria tenuis. Science, 134: 833-834.

The phenomenon of albinism as observed in citrus seedlings was also seen in mungbean. A standard method is evolved for estimation of toxin.

561. Raychaudhary, S.P. 1968. Diseases of pulses pose a challange to Plant Pathologists & Breeders. Indian Farming, 17(1): 39-43.

The diseases of pulse crops including mungbean and urdbean are described with respect to their symptoms and control measures.

562. Raychaudhury, S.P., Dhingra, K.L. and Varma, J.P. 1977. Virus diseases of pulse crops in India. Seeds and Farms, 3(4): 7-17.

Described virus diseases of pulses including mung/urd, pigeonpea, cowpea, soybean, pea, broadbean, frenchbean, lablab & sunhenp . Mung and urd diseases included yellow mosaic, mosaic, leaf crinkle and leaf curl. Control measures in general are mentioned.

563. Raychaudhury, S.P. and Pathanian, P.S. 1950. A mosaic diseases of Crotolaria mucronata Desv. (C. striata DC). Current Science, 19: 213.

A mosaic disease of C. mucronata was transmitted by the sap to P. mungo and P. aureus.

564. Reddy, D.B. (Editor) 1971. Outbreaks of pest and diseases and new records. Quarterly news letter Plant protection committee for the south east Asia and Pacific region, FAO, 14(3-4):5-15.

Besides several disease records, Sclerotium (Corticium) rolfsii is recorded on Phaseolus mungo.

565. Reddy, G.S. and Gupta, B.M. 1974. Epidemiological studies of leaf spot of mungbean(Phaseolus aureus Roxb.) caused by Alternaria alternata (Fr.) Keissl. Labdev, B., 12(3): 117.

Effects of four dates of sowing on the incidence of the disease on 14 varieties are tabulated.

566. Reddy, K.S., Pawar, S.E. and Bhatia, C.R. 1987. Screening for powdery mildew (Erysiphe polygoni D.C.) resistance in mungbean (Vigna radiata (L.) Wilczek) using excised leaves. Proceedings Indian Academy of Sciences (Plant Science), 97: 365-369.

Third trifoliate leaves from 21-25 day old plants were cultured in trays with tap water at 21±1°C. After 9-12 days leaves showed rooting from petioles & they could be maintained upto 40 days. Leaves were inoculated with conidial suspension of E. polygoni. In susceptible types lesions appeared 8-10 days after inoculation. Out of 55 entries RUM-1,5, 7, 11, 20, 22 & 33 were resistant. They were resistant under field conditions also.

567. Reddy, P.C. and Krishnaiah, K. 1983. Assessment of field losses : due to leaf crinkle virus on black gram. Indian Journal of Mycology and Plant Pathology, 13: 19 (Abstr.).

Yield losses due to leaf crinkle virus in varieties Polish minumu, Butta minumu, Tutaku minumu & LBG-17 were 41.18, 54.73, 66.9 & 69.32%, respectively. This reduction was contributed by pods per plant and seeds per pod.

568. Reeder, R.T., Whitmarsh, J., Gray, L.E. and Peterson, R.E. 1986. Inhibition of photosynthetic electron transport by metabolites produced by Phialophora gregata. Physiobogical and Molecular Plant Pathology, 28: 371-379.

Thε brown stem rot, caused by P. gregata in soybean, adzuki bean and mung bean is characterised by vascular browning of the stem and, in some cases, by chlorosis and necrosis of the leaves. The effect of compounds produced by P.gregata on light-driven electron transport in thylakoid membranes was investigated. The data show that atleast one metabolite produced by P.gregata can completely inhibit photosynthetic electron transport. The most potent inhibitor was the mother liquor from the crystallization of gregatin A. There appeared to be at least 2 sites of inhibition. Symptoms observed in brown rot may be due to inhibition of photosynthetic electron transport by a metabolite produced by P.gregata.

569. Regupathy, A., Rathnaswamy, R., Venkatarayan, D. and Subramanian, T.R. 1975. Physiology of yellow mosaic virus in green gram (Phaseolus aureus) with reference to its preference by Empoasca kerri Pruthi. Current Science, 44: 577-578.

Population of non-vector leaf hopper, E.kerri was higher on P.aureus plants infected with yellow mosaic virus. In addition to six aminoacids also detected in healthy leaves, virus infected tissues contained cystine, alanine and leucines of which the last has has been reported enhancing the feeding of aphids. Diseased leaves had a lower sugar content . It has been noticed that leaf hoppers avoid higher sugar contents. Decrease in calcium contents of diseased plants may render the cell walls more vulnerable to stylet penetration.

570. Reinking, O.A. 1918. Philippine economic plant diseases. Philippine Journal of Sciences, 13:165-216.

Reported rust of mungbean caused by Uromyces appendiculatus (Pers.) Link in Philippine.

571. Reinking, O.A. 1919. Plant diseases in the Philippines. Phytopathology, 9: 114-140.

Rust (U. appendiculatus (Pers.) LK) is common on Phaseolus mungo. Minute brownish slightly powdery, raised pustyles are produced on the lower surface of the leaf. Brown uredospores and black téliospores are produced in Sori.

572. Rewal, H.S. and Bedi, P.S. 1976. Epidemiology and control of Cercospora leaf spot of mung in Punjab. Indian Phytopathology, 29: 102-103 (Abstr.).

Incidence of C. canescens is severe under 14°C temp., more than 85% R.H. Plants with more than two C_1/Rs ratio were more susceptible. Late sown crop had less disease than early sowing. Three sprays of bavistin (0.07%) were effective but it delayed maturity of crop by 10 days. Last spray with DM-45 is beneficial.

573. Ribeiro Do Vale, F.X., Chaves, G.M. and Zambolin, L. 1985. Host range study of soybean rust in Brazil. Soybean Rust Newsletter, 7: 7-9.

In green house tests with 24 leguminous spp., Vigna mungo was the most susceptible to Phakopsora pachyrhizi with the highest average number of lesions/cm^2 leaf & highest sporulation intensity.

574. Routaray, B.N., Sahoo, H. & Das, S.N. 1986. Evaluation of green gram & black gram varieties against reniform nematode, Rotylenchulus reniformis. Indian Journal of Nematology, 16:27-29.

The green gram varieties ML-80, ML-62, TT 8E, Pusa-103, PDM-14 and black gram var. Ratnapur-1, UG-201, UG 135 showed resistant reaction. Other varieties showed moderately resistant to highly susceptible reaction. 17 varieties of each crop were tested.

575. Roy, A.J. 1967. Some fungi from Almora. Indian Phytopathology, 20: 340-344.

Reported Fusarium sp. on Phaseolus mungo.

576. Roy, A.K. 1973. Host range of Sclerotinia sclerotiorum and Sclerotium rolfsii in Jorhat, Assam. Science & Culture, 39: 319-320.

S. sclerotiorum reported pathogenic to Phaseolus aureus.

577. Roy, A.N. and Sharma, R.B. 1982. Effect of Phaseolus mungo L. seed coat leachate on fungal growth. Phytopathologia Mediterranea. 21: 31.

Results of in vitro studies showed that the urd leachate inhibited the growth of seed surface but not internally borne fungi.

578. Saikia, U.N. 1976. Blight of mung caused by Corticium sasakii - a new disease recorded from Assam. Indian Phytopathology, 29: 61-62.

An account of the incidence of etiology of blight of P. aureus resulting in upto 30% mortality is given.

579. Saikia, U.N. and Phookan, A.K. 1983. Efficacy of different fungicides against Corticium sasakii, the causal organism of blight of mung. Indian Phyto-Pathology, 36: 752-754.

Among 11 fungicides tested, the best for control of T. cucumeris on V. radiata were bavistin & benlate.

580. Saikia, U.N. and Roy, A.K. 1976. Natural occurrence of Corticium sasakii on few plants in Jorhat, Assam. Science & Culture, 42: 228-229.

Several new plant hosts were found naturally infected by C. sasakii (=T. cucumeris) including P. aureus & P. mungo. In all the cases colonies on PDA appeared hyaline but later turned brown. White nodule like sclerotia developed superficially within 3-5 days which later changed to chestnut brown.

581. Saini, L.C. and Parashar, R.D. 1982. Suitability of stable bleaching powder and other chemical formulations for the control of bacterial leaf spot of green gram. Indian Journal of Agricultural Sciences, 52:330-334.

SBP at 500 & 1000 ppm completely inhibited X.phaseoli in vitro. Soil drenching with SBP & seed dressing with Agallol- 3 resulted best seed germination of mung & the former treatment maximum increase in yield. Spraying or seed treatment + spraying with emisan-6 & SBP at 1000 ppm gave the best control. Maximum yield was with SBP at 1000 & 500 ppm as spray & seed treatment with SBP 1000 ppm spray.

582. Saksena, H.K. 1979. Epidemiology of diseases caused by Rhizoctonia spp. In Proceedings consultants group discussion on the resistance to soil borne diseases of legumes, ICRISAT, Hyderabad: pp.59-64.

R. solani causes web blight of several legume crops including mungbean and urdbean which is serious in north India. It becomes seed borne when floral parts are infected. The aerial strain of R. solani has very broad host range. R. bataticola causes blight & dieback in addition to root rot of both crops. Sclerotia of R. solani can survive upto 6 years at room tempera-ture. In soil survival differs strain to strain and is influenced by environment. Basidiospores are important source of inoculum and major factor of aerial dissemination of R. solani and their production is influenced by temperature, RH, light etc. It can grow from leaf to leaf. Pathogen may survive on other hosts. Organic amendments decrease inoculum in soil. Diseases are highly influenced by environment, age of plant, susceptibility of host etc.

583. Saksena, H.K. 1985. Relationship of environment and Rhizoctonia aerial blight. Indian Phytopathology, 38: 584. (Abstr.)

R. solani causes web or thread blight in several crops including green gram and black gram. Collateral weed hosts play an important role in the initiation and early spread of the disease to the main hosts, due to their special microclimate they are the first to take infection and then facilitate the production of basidiospores of the perfect state of the pathogen. There after the pathogen becomes air borne. Disease developed fast at mean temperature of 20.5-30.5°C & 86-100% RH. Most suited temperature is 26-28°C and 100% RH. Spores produced best at 24°C & 95% RH in night. Fungus survies as sclerotia.

584. Saksena, H.K. and Dwivedi, R.P. 1973. Web blight of black gram caused by Thanetophorus cucumeris. Indian Journal of Farm Sciences, 1(1): 58-61.

The disease apparently newly reported caused severe damage to Phaseolus mungo. Sclerotia were produced abundantly on affected parts and fallen leaves. Basidiospores were formed on healthy tissues adjacent to lesions and also in vitro. Pathogenicity of the isolate was proved on P. mungo and wide range of other hosts.

585. Saleh, N., Honda, Y., Iwaki, M. and Tantera, D.M. 1986. Occurrence of black gram mottle virus on mung bean in Indonesia and seed transmission of the virus. Technical Bulletin of the Tropical Agricultural Research Centre No.21: 203-212.

The virus isolated from V. radiata plants showing mottling, was transmitted mechanically, beetles (Colposcelis signata and Balisepta fulvipes) and through infected seed. Purified preparations contained isometric particles 28 mm diameter with a UV absorption spectrum typical of nucleoproteins with a A_{260}/A_{280} of 1.53. Indonesian and Thai isolates showed identical serological reactions but did not react serologically with some other beetle borne viruses. The virus could be detected at high

concentration by ELISA and mechanical inoculation tests with whole seeds, and at low concentration from seeds from which the coats had been removed.

586. Samiappan, R. and Vidhyasekaran, P. 1981. Differences between Macrophomina phaseolina isolates causing root rot and leaf blight of urdbean. Indian Phytopathology, 34: 407-409.

The root rot isolate grew more profusely in urdbean hypocotyl extract medium while leaf blight isolates preferred the host leaf extract medium. Glucose increased polygalacturonate trans-eliminase production by the root rot isolate and decreased the enzyme production by the leaf blight isolates.

587. Sandhu, D.S. 1977. Breeding for yellow mosaic virus resistance in mungbean, Ist International mungbean Symposium, AVRDC, Taiwan: 176-179.

Lines ML 109 and ML 161 are reported completely free whereas linew ML 111 and ML 131 to have MYMV in traces. LM 214 was resistant both in glass house & field. LM 113, LM 168, LM 170, LM 171, & LM 404 were resistanec to MYMV under field conditions and possessed high degree of resistance to bacterial blight and Cercospora leaf spot.

588. Sandhu, T.S., Brar, J.S., Sandhu, S.S. and Verma, M.M. 1985. Inheritance of resistance to mungbean yellow mosaic virus in green gram. Journal of Research, Punjab Agricultural University, 22:607-611.

In crossing involving MYMV resistant cvrs of mungbean (15229), resistance showed monogenic dominant control but in crosses of L-24-2 resistance was controlled by 2 complementary recessive genes.

589. Satischandra, K.M., Hiremath, R.V. and Hegde , R.K. 1979. Effect of organic amendment and fungicides on the saprophytic activity of R.bataticola causing root rot of beans. Indian Phytopathology, 32:543-546.

Wheat straw & paddy hull reduced the saprophytic activity of R.bataticola in the soil but FYM and green grass did not have much effect. Brassicol and captan were very effective in reducing the saprophytic activity whereas bavistin and DM-45 were not effective.

590. Sattar, A. 1952. Connection of R.bataticola (Taub.) Butler, the causal fungus of root rot of cotton & some other isolates of R.bataticola with the pycnidial stage of Macrophomina phaseoli (Maubl.) Ashby. Pakistan Journal of Scientific Research, 4:31-35.

Isolates of R.bataticola from cotton, tobacco, chillies, citrus and sesamum infected several living hosts including mungbean. Inoculation tests proved M. phaseoli as pycnidial stage of R. bataticola which were formed on cut pieces of twigs of sesamum.

591. Saxena, R.M. 1984. Evaluation of infection percentage and crop loss estimates of some seed borne infections of green gram and black gram in Uttar Pradesh. Indian Journal of Plant Pathology, 2: 146-148.

Infection of mung bean and urd bean seeds by seed borne fungi was evaluated and the extent of damage caused to both crops in Uttar Pradesh was estimated.

592. Saxena, R.M. and Gupta, J.S. 1979. Field fungi associated with seeds of Vigna radiata (L.) Wilczek var. radiata and V. mungo (L.) Hepper and their persistence during storage. Proceedings of the Indian National Science Academy B 45: 636-638.

Most of the field fungi associated with the seed persisted as long as 120 days in storage at RH 45-78 % and 6.2-29.6°C. They were replaced by storage mycoflora between 120 and 300 days at RH 28.2-87%. The pathogenic spp. Ascotricha chartarum, Colletotrichum truncatum, Fusarium oxysporum and F.semitectum appeared to be seed borne.

593. Saxena, R.M. and Sinha, S. 1978. Histopathological investigations of the 'Field Fungi' associated with the seeds of Vigna radiata and V. mungo (L.) from U.P. and Haryana. Indian Journal of Mycology and Plant Pathology, 8: 61.

The relation of seed borne pathogens with seed tissues of mung bean and urd bean was observed by section cutting and microscopic observations.

594. Saxena, R.M. and Gupta, J.S. 1981. Field survey for suspected seed transmitted diseases of mungbean and urdbean in Uttar Pradesh. Indian Phytopathology, 34: 340-345.

In districts of Farrukhabad, Kanpur and Hamirpur foliage of mung & urd seed crops were found infected by Ascotricha chartarum, C. canescens, C. truncatum E. polygoni, F. oxysporum, F. semitectum, Glomerella lindemuthianum, M. phaseolina, Phytophthora parasitica, Protmycor is sp. & Uromyces appendiculatus.

595. Saxena, R.M. and Gupta, J.S. 1982. Effect of seed leachates on spore germination of seed borne fungi of Vigna radiata. Indian Phytopathology, 35:236-240.

Leachate obtained after 6,12 &18 hrs of soaking, V. radiata and V. mungo seeds produced both inhibitory & stimulatory effects on spore germination. The effect depending on the fungus tested, duration of soaking and crop. The leachates contained 8 sugars, 12 aminoacids and 5 organic acids.

596. Saxena, R.M. and Sinha, S. 1977. Seed borne infection of Vigna mungo in Uttar Pradesh, Indian Phytopathology, 30: 582-583.

On isolation the seeds of urdbean yielded Ascotricha chartarum, Berk., Colletotrichum truncatum (Schw.) Andras and Moore and Fusarium semitectum Berk and Rav. These fungi produced characteristic disease symptoms under glasshouse conditions.

597. Saxena, R.M. and Sinha, S. 1977. Abnormal isolates of seed borne Colletotrichum truncatum (Schw.) Andrus & Moore from India. Current Science, 46:716.

Few abnormal isolates of the fungus C. truncatum were isolated from seeds of Mungbean and Urdbean from Haryana and U.P. The gross morphology was close to C.truncatum but isolates were slow to sporulate and conidia were at lower ends of size range which is 17-32 /u x 3.5-4.0 /u and the mycelium showed the greater tendency of forming sclerotial aggregates.

598. Saxena, R.M. and Sinha, S. 1977. Seed borne infections on Vigna radiata (L.) Wilczek var. radiata in Uttar Pradesh- new records. Science & Culture, 44: 377-379.

The report includes Ascotricha chartarum, C.truncatum and Fusarium oxysporum.

599. Saxena, R.M. and Sinha, S. 1979. Field mycoflora of Vigna radiata (L.) Wilczek var. radiata and Vigna mungo (L.) Hepper in relation to pre-emergence & post emergence mortality. Seed Research, 7:159-164.

Several species of Aspergillus and other fungi are associated with seeds of mung & urdbean. Under glass house condition the test organism produced five main types of mortality symptoms viz. inhibition of seed germination, seed rot, radicle necrosis, seedling necrosis and damping off of seedlings.

600. Saxena, R.M. and Sinha, S. 1980. Storage mycoflora of Vigna radiata & Vigna mungo in relation to pre emergence and post emergence mortalities. Indian Journal of Mycology & Plant Pathology, 10:120-121.

Storage mycoflora associated with mungbean and urd bean seeds were detected. Pre-emergence & post emergence mortality symptoms caused by different fungi were of 8 types & accordingly mycoflora were grouped.

601. Schmitthenner, A.F., Hoitink, H.A.J. and Kroetz,M.E. 1971. Halo blight of mungbean incited by a new strain of Pseudomonas phaseolicola. Phytopathology,61:909

Reported halo blight of mungbean caused by P.phaseolicola from U.S.A.

602. Schroth, M.N., Vilma Vitanza, B. and Hildebrand,D.C. 1971. Pathogenic and nutritional variation in the halo blight group of fluorescent pseudomonads of bean. Phytopathology, 61:852-857.

A culture HB 48 of Pseudomonas phaseolicola originally isolated from mung seed by D.C. Graham of Scotland in 1966, also infected few varieties of bean, lima bean and soybean.

603. Scott, H.A. and Phatak, H.C. 1979. Properties of black gram mottle virus, Phytopathology,69:346-348.

Black gram mottle virus is transmitted by Epilachna. varivestis and Ceratoma trifurcata which require atleast 24 hrs acquisition period for maximum transmission on urd.

604. Sengupta, P.K. 1974. Diseases of major pulse crops in India. PANS,20: 409-415.

Described diseases of pulses in India including mung bean and urd bean. They are rust, leaf spot, root rot and anthracnose, angular black spot of black gram. Phomopsis seedling blight is also reported Bacterial leaf spot & halo blight of green gram was among the bacterial diseases. Virus diseases were yellow mosaic, leaf crinkle, mosaic mottle and lea f curl. Mosaic mottle disease causes phyllody. The leaf curl virus may cause death of plants and is transmitted by sap, seed and aphids, A.craccivora and leaf hopper, Circulifer tenellus.

605. Seth, M.L., Raychaudhuri, S.P. and Nath, R. 1967. A new mosaic disease of brinjal (Solanum melongena L.). Phytopathologische Zeitschrift, 59: 385-389.

A new mosaic of brinjal (identified due to a CMV strain) was sap transmissible and produced local lesions on host plants including P.mungo and P.aureus.

606. Shahare, K.C. and Raychaudhuri, S.P. 1963. Mosaic disease of urd (Phaseolus mungo L.). Indian Phytology, 16: 316-318.

Host range, histopathological studies, symptoms, physical properties of mosaic disease of urd are discussed. It is explained to be a strain of BCMV.

607. Shahzad, S., Ghaffar, A. 1986. Outbreaks and new records from Pakistan: Macrophomina phaseolina on some new hosts. FAO Plant Protection Bulletin, 34:163.

The new records include Carthamus tinctorius, Vigna radiata, radish and Salsola baryosma.

608. Shanta, P. and Menon, K.P.V. 1961. Studies on some properties of the coconut wilt virus. Indian Coconut Journal, 15: 36-46.

A virus isolated from field grown Areca catechu and various weeds at Central Coconut Research Station Kayangulam, caused the same symptoms on P.mungo.

609. Sharda, R. and Shetty, H.S. 1987. Location and transmission of Macrophomina phaseolina in blackgram seeds. Indian Phytopathology, 40: 194-196.

Of the four seed components, seed coat was found to be the main site of infection. The fungus transmitted from seed to seedling. In addition to infected collar region the ungerminated seed and detached cotyledons provide an extra source of inoculum in the soil for root infection.

610. Sharma, H.C., Khare, M.N., Chand, J.N. and Kumar, S.M. 1970. Efficacy of fungicides in the control of diseases of urd (Phaseolus mungo L.). Recent Advances in crop production , U.P. Institite Agricultural Sciences, Kanpur, pp.271-274.

Seed-borne fungi like species of Alternaria, Curvularia, Fusarium, Rhizoctonia and Rhizopus were checked by fungicidal seed treatment. Maximum stand in field was with Thirum seed treatment. PCNB was the most effective as spray followed by Dithane M-45.

611. Sharma, H.C., Khare, M.N., Joshi, L.K. and Kumar, S.M. 1971. Efficacy of fungicides in the control of diseases of kharif pulses - mung and urd. All India Workshop on Kharif Pulses, pp.2.

The sequence of appearance of various diseases on mung and urd was examined. The first disease was anthracnose caused by Colletotrichum lindemuthianum followed by Macrophomina phaseolina seedling rot and web blight. Sclerotium rofsii, Cercospora spp., Alternaria sp., Myrothecium roridum, and Xanthomonas spp. appeared later while podwery mildew appeared in the last at Jabalpur. TMTD seed treatment resulted in maximum emergence. The least disease index was in the spray with PCNB followed by Morestan, Dithane M-45 and Captan.

612. Sharma, I. and Dubey, G.S. 1981. Studies on seed borne nature of aphid transmitted urdbean leaf crinkle virus. III International Symposium on Plant Pathology, IPS, New Delhi : 166 (Abstr.).

ULCV was isometric virus 40 nm in diameter. It was carried in 17.5% seed & was confined to cotyledons and embryo. Concentrations was higher in cotyledons and did not affect seed germination. Location of pod in plant & seed in pod did not influence degree of seed transmission. Degree of transmission decreased with advancement of plant age at infection.

613. Sharma, I. and Dubey, G.S.1981. Histopathology of leaf crinkle virus infected urdbean plants. Indian Phytopathology, 34: 113 (Abstr.).

Infected leaves showed reduction in palisade, paranchyma, repeated cell division at the margin of epidermis, increased number of Zylem vessels with more thickened walls and reduction in phloem. Size of Xylem vessels is reduced. Cortical & phloem cells are disintegrated and cell wall of most tissues are thickened. In diseased flower buds which were completely burried in leafy bracts & calyx, complete degeneration of androecium and gynaecium was observed. However, differentiation of cells for pollen mother cells and ovary formation occurred in flower buds obtained from plants infected at late stage.

614. Sharma, I, and Dubey, G.S. 1983. Histopathological changes in urdbean flowers due to urdbean leaf crinkle virus infection. Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz, 90: 63-67.

Notable changes observed in Vigna mungo included degeneration of androecium and gynoecium, incomplete development of pollen grain in pollen tetrads, non-formation of ovules and abnormal ovarian cavity. The histopathological abnormality is corroborated with the pollen sterility and loss in pod setting in infected plants.

615. Sharma, I. and Dubey, G.S. 1984. Control of urdbean leaf crinkle virus through heat treatment, chemotherapy and resistance. Indian Phytopathology, 37: 26-30.

The seed borne ULCV was completely eliminated by treating seed at 55°C for 30 min. Pre inoculation drenching of plants by Benlate or Bavistin 1% fully checked disease development. Thiouracil or decoction of tea or coffee delayed symptom appearance. Spray with IAA or IBA increased infection percentage. Urdbean and mungbean varieties were reported to possess resistance.

616. Sharma, I. and Dubey, G.S. 1985. Some pathophysiological changes in urdbean (Vigna mungo) induced by urdbean leaf crinkle virus. Indian Phytopathology, 38:624(Abst.).

The ULCV is sap, aphid transmitted, spherical 32 nm in diameter. In var. Kulu it decreased dry weight, chlorophyll 'a' and 'b', O.D.phenoles, ascorbic acid & protease whilh total phenols, reducing & non reducing sugars were increased. PPO activity was reduced at initial & severely crinkled stages. Diseased plant synthesized an additional aminoacid, glycine. Other aminoacids were also affected.

617. Sharma, I. and Dubey, G.S. 1985. Anatomy of urdbean leaf crinkle virus infected urdbean root. Indian Journal of Plant Pathology, 3: 236-237.

Urd bean roots of plants infected by ULKV were examined. Infection resulted in change of different tissues as compared to uninfected plant.

618. Sharma, O.P., Tiwari, A. and Kulkarni, S.N. 1975. Effect of seed treatment with systemic and nonsystemic fungicides on the controb of seedling blight of mung (Phaseolus aureus) caused by R. solani. Indian Phytopathology, 28: 114-115.

The best control of the disease was given by Benlate, followed by vitavax, demosan and brassicol. None of the treatments protected plants against collar infection.

619. Sharma, O.P. and Tiwari, A. 1975. Effect of chloroneb on Pythium aphanidermatum. Indian Phytopathology, 28 :115-117.

Chloroneb at 200 ppm was inhibitory to P. aphanidermatum, the green gram root rot fungus. It also reduced oospore formation till the fungus was in contact of fungicide.

620. Shekhawat, G.S. and Patel, P.N. 1977. Seed transmission and spread of bacterial blight of cowpea and leaf spot of green gram in summer & monsoon seasons. Plant Disease Reporter, 61: 390-392.

During summer (mean R.H. 20-80% and temp. 25-34°C) the incidence of leaf spot on mung was only 0, 3 & 32% from 1, 10 & 100% initial seed infestation. Disease became severe during monsoon (mean R.H. 50-95% & temp. 24-32°C). Disease free seed can be produced during summer by careful roguing of infected seedling & disease incidence is also low.

621. Shirsat, A.M., Kale, U.V. and Pawar, N.B. 1976. Incidence on halo blight caused by P. phaseolicola (Burk.) Dowson on green gram (P. aureus) in Maharashtra state. Journal of Maharashtra Agricultural Universities, 1: 314.

Severe outbreak of halo blight of green gram observed at Badnapur after 15 days of sowing when the crop was in 2 trifoliate leaf age. Prevalence of intermitant rains & cloudy weather during 2nd half of July favoured the disease spread. The symptoms of disease were described in detail. Variety Kopergaon had less than 10% disease incidence & graded as resistant while J 781 & Pusabaisakhi were semi resistant.

622. Shivnathan, P. 1977. A seed borne virus of P. aureus Roxb. Symposium on virus diseases of tropical crops, Tropical Agriculture Research Series No.10:143-150.

A discription is given of symptoms, host range, physical properties and serological relationship of a strain of tobacco ring spot virus (TRSV) causing a mosaic disease of green gram.

623. Shpiler, L.K. and Bruter, B.P. 1977. A method of evaluating the resistante of bean to brown bacteriosis. Selektsiyai Semenovodstvo, 2: 27-28.

In the field infection of Xanthomonas phaseoli was observed on P. aureus.

624. Shree Kumar, K. 1974. Studies on foliar fungal diseases of urd leading to their control. M.Sc.Ag. Thesis, JNKVV, Jabalpur , pp. 84.

Several fungi causing foliar diseases of urd were found associated with seed, phyllosphere and soil. They were found to get splashed from soil to phyllosphere by rain. Dissemination by splash was not observed in case of pathogens present below 5 cm of soil depth and in plots where the soil surface was covered by straw. Spray of fungicides particularly sulfex reduced the diseases and improved the yield.

625. Shukla, D.N. and Bhargava, S.N. 1975. Some studies on Fhsarium oxysporum Schl. ex. Fries isolated from seeds of PHaseolus mungo Roxb. Proceedings of the National Academy of Sciences, India B, 45: 93-96.

Data are presented on cultural and pathological studies on the fungus isolated from P. mungo.

626. Shukla, D.N. and Bhargava, S.N. 1976. Fungi isolated from seeds of pulses. Proceedings of the National Academy of Sciences, India B, 46: 453-454.

Aspergillus flavus, Curvularia verruculosa, Fusarium solani, F. oxysporum and M. phaseolina were isolated from black gram and C.lunata, C.verruculosa, F.solani and M. phaseolina from green gram.

627. Shukla, D.N. and Bhargava, S.N. 1976. Some pathogenic fungi from pulses and oil seed crops. Proceedings of the National Academy of Sciences, India B, 46: 531-532.

The pathogenic fungi of black gram (seed-borne) were M.phaseolina, F.oxysporum and F.solani and of green gram- M. phaseolina, F.solani and Curvularia lunata.

628. Shukla, G.P.1986. Etiology and breeding for resistance to yellow mosaic in green gram- A review. Agriculture Review, 7(1): 31-38.

An exhaustive review on mungbean yellow mosaic is given. The work done on breeding resistant mungbean varieties is revised & sources of resistance in other species are given.

629. Shukla, G.P., Pandya, B.P. and Singh, D.P. 1978. Inheritance of resistance to yellow mosaic in mung bean. Indian Journal of Genetics & Plant Breeding, 38: 357-360.

The parents, Tarai local (resistant), L-80(moderately resistant), L-294-1 & LM 214 (tolerant) and Jawahar 45 and G-65 (susceptible), their F_1, F_2 & F_3 generations were inoculated artificially. The resistance was found to be under digenic control & recessive in all the crosses.

630. Shukla, G.P. and Pandya, B.P. 1985. Resistance to yellow mosaic in green gram. SABRAO Journal, 17: 165-171.

Where s_1 & s_2 are duplicate recessive resistance genes and I is an inhibitor which counteracts the effects of some combinations of the dominant allels S_1 &S_2. Tarai local (resistant), $s_1s_1s_2s_2$ ii; L 80(moderately resistant)& L-294-1 (tolerant) s_1s_1 S_2S_2 II; LM-214 (tolerant) S_1S_1 s_2s_2 II & Jawahar 45 & G-65(susceptible) S_1S_1 S_2S_2 ii. Tarai local is recommended for use in resistance breeding.

631. Shukla, V.N. 1958. Sclerotial blight of mung & urd. The Nagpur Agriculture College Magazine, 32:30-32.

A disease of urd & mung caused by Sclerotinia sclerotiorum is described in regard to symptoms, pathogen identification etc.

632. Shyam, R. and Bhatnagar, P.S. 1965. Phyllody in black gram (Phaseolus mungo L.). Science & Culture, 31; 312-313.

It is caused by a virus, possibly a mycoplasma like organism and is characterised by the transformation of floral parts into leaf like structures.

633. Sideris, C.P. 1929. Pythiaceous root parasites of various agricultural plants. Phytopathology, 19:1140-1147.

Mungbean is reported to be susceptible to most species of Pythium.

634. Sideris, C.P. 1932. Taxonomic studies in the family Pythiaceae II Pythium. Mycologia, 24: 14-61.

Among the species of Pythium, P. splendens var. hawaiianum is reported parasitic on P. aureus.

635. Singh, A.K. and Singh, R.B. 1980. Alteration in protein yield and protein quality in urdbean infected by Southern bean mosaic virus. Annales de Phytopathologie, 12: 131-138.

Bean southern mosaic virus infection of urd increased the total nitrogen, protein nitrogen, ash value in leaf & leaf protein concentrate (LP'c). Infection also increased fiber content, lipid & phosphorus but decreased total soluble sugars, starch & calorific value in diseased samples. Free aminoacids were also increased but enzymatic hydrolysis decreased in infected plants.

636. Singh, A.K. and Srivastava, S.K. 1985. Effect of urdbean mosaic virus infection on the yield and chemical composition of urd bean fruits. Indian Phytopathology, 38: 85-89.

UBMV infection reduced number of pods/plant, seeds/pod and seed weight in urdbean type -9. The per cent yield loss was higher in early inoculated plants. It increased nitrogenous fractions except ammonical nitrogen. Carbohydrate fractions decreased in infected fruit parts. All phosphorus fractions were also reduced in infected fruit parts in comparison to their healthy counter parts.

637. Singh, A.K. and Srivastava, S.K. 1985. Nodular physiology of urdbean as affected by urdbean mosaic virus. V Effect on some enzymatic activity. Phyton Austria, 25: 213-217.

In pot trials infection reduced the activity of catalase and nitrogenase & increased that of peroxidase and nitrate reductase in nodules of V. mungo. The activities were higher in soil than in sand.

638. Singh, A.K., Srivastava, S.K. and Singh, A.K. 1985. Effect of milk on infectivity of urdbean mosaic virus. Indian Journal of Mycology & Plant Pathology, 15: 311-312.

Multiplication of UBMV was inhibited by the milk of goat, buffalo and cow in vitro to an extent of 90, 70 & 50%, respectively. It also inhibited when used as spray on plant before or after inoculation.

639. Singh, A.K., Srivastava, S.K. and Singh, S.V. 1985. Nodular physiology of urd bean affected by uribbean mosaic virus. VI Leghaemoglobin content. Acta Botanica Indica , 13 : 131-133.

Virus infection lowered the leghaemoglobin content in the nodules of Vigna mungo plants grown from Rhizobium treated seed in sterilized soil and sand potting media.

640. Singh, A.K., Srivastava, S.K. and Singh, A.K. 1985. Nodular physiology of urdbean as affected by urd bean mosaic virus II. Effect on nitrogen content. Indian Journal of Virology, 1: 325-329.

In pot tests infection of urd bean increased total nitrogen, nitrite and nitrate nitrogen, protein & total free amino acids but decreased the content of ammonical nitrogen in the nodules.

641. Singh, B.M., Saharan, G.S., Sood, A.K. and Shyam, K.R. 1978. Ascochyta leaf spot of mash and cowpea. Indian Phytopathology, 31: 388-389.

A severe leaf spot of mung, urd & cowpea was noticed at Palampur, Kulu valley, due to Ascochyta phaseolorum Sacc. Disease starts as small, circular discoloured areas with or without margins on 1 month old plants. Morphology of fungus and its pathogenicity is described with symptoms of disease.

642. Singh, B.M., Sood, A.K. and Saharan, G.S. 1978. Occurrence of a leaf spot and blight of black gram caused by Colletotrichum dematium. Indian Phytopathology, 31: 100-101.

A leaf spot and blight caused by Colletotrichum dematium appeared in Himachal Pradesh. Small water soaked, greenish spots, later enlarging to irregular light brown, thin, papery and turning to straw coloured with narrow reddish margins, appeared on leaves finally resulting in shot holes. Pathogenicity tests were successful. This is a new report.

643. Singh, B.R., Singh, M., Yadav, M.D. and Dingar, S.M. 1982. Yield loss in mung bean due to yellow mosaic. Science & Culture, 48: 435-436.

In pot experiment early infected plants had more severe symptoms than late infected ones. Chlorosis, stunting & reduced branching contributed to yield loss. The avoidance of early infection by cultural or vector control is recommended.

644. Singh, B.R., Singh, R.B., Singh, H.C. and Gangulu, R. 1979. Observations on a virus disease of coffee seuna. Indian Journal of Mycology & PLant Pathology, 9: 101.

A new virus of Cassia occidentalis was transmitted by sap but not aphid or seed to urd causing mosaic symptoms. Longevity in undiluted C. occidentalis sap was 12 days at 22-24°C, TIP 70°C and DEP was 10^{-4}.

645. Singh, B.V. and Ahuja, M.R. 1977. Phaseolus sublobatus Roxb.: A source of resistance to yellow mosaic virus for cultivated mung. Indian Journal of Genetics & Plant Breeding, 37: 130-132.

Out of 2 strains of P. sublobatus, only Pantnagar strain showed resistance to MYMV. Crossing of this strain with mung bean was successful. Both strains have been described.

646. Singh, D. and Patel, P.N. 1977. Studies on resistance of crops to bacterial diseases in India. VIII. Investigations on inheritance of resistance to bacterial leaf spot and yellow mosaic diseases and linkage, if any, with other characters in mung bean. Indian Phytopathology, 30: 202-206.

The resistance to mung bean bacterial leaf spot pathogen X. phaseoli, in mungbean lines P-476, P-646, PLM-501 and Jalgaon-781 was found to be controlled by a single gene which is dominant, whereas, yellow mosaic tolerance in variety 24-2 was governed by a signle recessive gene. The genes controlling disease reactions, seed colour and maturity were independently inherited and freely combined.

647. Singh, D.P. 1980. Inheitance of resistance to yellow mosaic virus in black gram (Vigna mungo (L.)Hepper). Theoritical and Applied Genetics, 57: 233-235.

Resistance to mung bean yellow mosaic virus was found to be digenic and recessive in all crosses between highly resistant and highly suceptible lines, and free from cytoplasmic effect.

648. Singh, D.P. 1981. Breeding for resistance to diseases in green gram & black gram. Theoritical & Applied Genetics, 59: 1-10.

Symptoms, hosts & transmission of some virus, fungal and bacterial diseases of mung & urd are outlined and information on breeding and the genetics is reviewed.

649. Singh, D.V. and Mishra, A.N. 1975. Varietal resistance of green gram (P. aureus) to Cercospora leaf spot. Indian Journal of Mycology & Plant Pathology, 5:207.

Out of 730 vultivars and germplasm lines of P. aureus tested against C. canescens, 9 were resistant. They were OB-41, P 48-68, P 273, P 546-68, 362-68, 364-68, 4470-2, 11150, 12-14/3-1-1-1-1.

650. Singh, D.V., Singh, R.R. and Mishra, A.N. 1976. Search for sources of resistance to powdery mildew in black gram. Current Science, 45: 641.

Results are presented on varietal tests on Phaseolus mungo against Erysiphe polygoni.

651. Singh, D.V. and Singh, R.R. 1976. Chemical control of Cercospora leaf spot of green gram. Indian Phytopathology, 29: 337-339.

As a result of field trials with six fungicides at 3 kg/ha, Blue Copper-50 or miltox are recommended for the control of C. canescens on P. aureus.

652. Singh, D.V. and Singh, R.R. 1978. Field evaluation of fungicides for the control of Cercospora leaf spot of green gram. Pesticides, 12(6): 28-29.

Leaf spot caused by C. canescens on P. aureus was controlled by two sprays of Bavistin (0.5 kg/ha) at an interval of 15 days with corresponding increase in yield. Captan and Zineb were also effective but did not increase the yield.

653. Singh, Gurdip, Singh, Kuldip, Gill, A.S., Kapoor, S. and Verma, M.M. 1983. Screening for resistance to mungbean yellow mosaic virus in urdbean (Vigna mungo (L.) Hepper). Indian Phytopathology, 36: 185 (Abstr.).

Out of 846 lines screened, UG lines No.135, 253, 254, 255, 261, 267, 291, 292, Mash 1-1 & UAH 2B gave grade 1 on 5 point scale. Several lines gave grade 2 reaction.

654. Singh, Gurdip, Kapoor, S. and Singh, Kuldip 1987. Multiple disease resistance in mungbean with special emphasis on yellow mosaic virus. II International Symposium on mungbean, Bangkok, Thailand: 25-26(Abst.).

4380 mungbean germplasm lines were screened, of which ML Nos. 234, 268, 269, 272, 274, 338, 360, 369, 371; LM Nos. 113, 687, 695, 696, 744,; MUG Nos. 125, 130, 132 to 136, 138, 139, 145, 170, 173, M-13 & Tarai local were resistant to MYMV, Cercospora leaf spot and bacterial leaf spot. AVRDC lines V-2182 & V-2294 were resistant to leaf crinkle & MYMV.

655. Singh, I. and Chohan, J.S. 1973. Seed borne fungi of green gram (Phaseolus aureus) in the Punjab. Indian Journal of Mycology & Plant Pathology, 3: 199.

The fungi detected with mung seed were A. flavus, A. niger, Chaetomium olivaceus, F. oxysporum, Penicillum chrysogenum, Rhizopus arhizus, Rhizoctonia bataticola and Sporotrichum sp.

656. Singh, I. and Chohan, J.S. 1976. Seed borne fungi in black gram (Phaseolus mungo) in the Punjab. Indian Mournal of Mycology & Plant Pathology, 6: 80.

The fungi detected with urd bean seed were A. niger, curvularia sp., F. equiseti, F. oxysporum, Penicillium crustosum and Phoma glomerata. Reduction in seed germination due to fungi is discussed.

657. Singh, I. and Prasad, S.K. 1978. Influence of pesticides on rhizosphere microbial population of mung & wheat crops. Indian Journal of Nematology, 8: 102-109.

658. Singh, J.P. 1980. Effect of virus diseases on growth components and yield of mung bean (Vigna radiata) and urdbean (Vigna mungo). Indian Phytopathology, 33: 405-408.

YMV, mung urd msoaic virus 1 & 2 & ULCV decreased growth components in all except ULCV which occasionally increased growth which was accompanied by drastic decrease in yield.

659. Singh, J.P., Kadian, O.P. and Verma, J.P. 1979. Survey of virus diseases of mung bean and urd bean in Haryana. Haryana Agricultural University Journal of Research, 9: 345-347.

Incidence of mung bean yellow mosaic, urd bean mosaic and urd bean leaf crinkle virus on Vigna radiata and V. mungo is tabulated. All were more serious on mung bean than on urd bean, possibly due to the choice of varieties grown. The diseases are reviewed.

660. Singh, J.P. and Suhag, L.S. 1982. Pigment, nucleic acid and protein concentration in the virus infected mung bean & urd bean leaves. Indian Journal of Mycology and Plant Pathology, 12: 61-63.

Alterations in chlorophyll, caratenoid, nucleic acid and protein contents of V. radiata & V. mungo plants infected with 4 viruses were determined. It was concluded that physiological changes in infected plants did not present a complete insight into the effects on the host.

661. Singh, J.P. and Verma, J.P. 1977. Effect of some insecticides and oils on incidence of yellow mosaic and grain yield of mung bean cv. Varsha. Proceedings of the National Academy of Sciences, India B.,47:219-225.

Soil application of solvirex at sowing followed by 3 weekly foliar sprays of metasystox starting after 20 days controlled Bemisia tabaci on V. radiata and increased grain yield.

662. Singh, J.P. and Verma, J.P. 1977. Mosaic disease of mung and urd bean in Haryana. Proceedings of the National Academy of Sciences, India B, 47:33-40.

Various types of mosaic symptoms on mung bean and urd bean were caused by two different viruses tentatively designated as mung/urd mosaic virus 1 (MUMV-1) and mung/urd mosaic virus 2 (MUMV-2) in Haryana. Vigna cadjang and Dolichos lablab were the distinct local lesion hosts of MUMV-1 and MUMV-2, respectively. Both the viruses were easily sap and seed transmitted but different with each other in host range, host reaction, physical properties and were serologically unrelated. MUMV-1 was found more related to bean common mosaic virus than other leguminous viruses infecting mung and urd bean.

663. Singh, Kuldip, Khatri, H.L. and Bansal, R.D. 1975. Chemical control of Cercospora leaf spot of Phaseolus aureus. Indian Journal of Mycology & Plant Pathology, 5: 108-109.

In a field trial Zineb 83%, Blitox-50, Benlate, Captan and streptocycline reduced the amount of leaf spot caused by Cercospora cruenta. Benlate gave the best control.

664. Singh, Kuldip, Virmani, S.S. and Chohan, J.S. 1973. Field screening of urd (P. mungo) varieties against maturity wilt phase of the dry root rot disease caused by Macrophomina phaseoli in Punjab. Indian Journal of Mycology & Plant Pathology, 3: 194-195.

The disease manifests at maturity when whole plant dries, pods shrival & grains poorly formed. Out of 42 lines of urd, U-99, U-354, 355, EC-2543, H-10, NP-4, NP-14, Pb-119, BR-68, M 1-1 & L 26-59 were free.

665. Singh, Leena and Srivastava, S.N. 1985. Studies on the morphology & Taxonomy of Colletotrichum species parasitizing pulse crops in northern India. Indian Phytopathology, 38: 616 (Abstr.).

For the identity of C.dematium, C.gloesporioides parasitizing 11 pulse crops including black gram & green gram some consistant characters viz. shape & size of conidia, presence & position of chlamydospores, shape, size & colour of appresoria and presence or absence of typical sclerotia were further confirmed.

666. Singh, N. and Rao, D.N. 1986. Influence of sulphur dioxide on the growth and productivity of Phaseolus aureus. Acta Botanica Indica., 14: 230-235.

The pollution effects on mung bean plants, were correlated with SO_2 dose. A higher cumulative SO_2 dosage immediately resulted in an appreciable reduction in plant growth & productivity. The extent of growth reduction was proportional to the SO_2 level of exposure.

667. Singh, P.P. and Thind, B.S. 1981. Histological changes and enzyme production in mung bean in response to infection with Xanthomonas phaseoli f. sp. Vignaeradiatae & Cercospora canescens. III. International Symposium on Plant Pathology, IPS, New Delhi: 202-203. (Abstr.).

Detailed histological changes in mungbean leaves due to infection by both the pathogens were observed. Their infection caused secretion of enzymes which was more in case of C.canescens.

668. Singh, P.P. and Thind, B.S. 1984. Interaction between Xanthomonas campestris pv. vignaeradiatae (Sabet et al.) Dye and Cercospora canescens Ell. et Mart. on mung bean in relation to disease development. Phytopathologia Mediterranea, 23: 75-76.

On 8nca month old plant, intensity of Cercospora was higher than bacterial spot irrespective of sequence

of inoculation on mung. Total sugars, total phenols & protein percentage was higher in plants inoculated by bacterium alone as compared to bacterium + Cercospora or Cercospora alone. Protease activity was higher in fungus alone than in combination or bacterium alone. Cellulose was similar in all treatments. In vitro fungus produced more protease and cellulose than bacterium. Cercospora produced Cercosporin in vitro & in vivo.

669. Singh, P.P. and Thind, B.S. 1987. Histological changes in green gram leaves in response to Xanthomonas campestris pv. vignaeradiatae and Cercospora canescens infection. Indian Phytopathology, 40: 149-159.

The infection by X. campestris pv. vignaeradiatae & C. canescens in green gram leaves resulted in rupturing of epidermal, palisade and spongy parenchyma cells, increased intercellular spaces, degradation of cell wals, collapse of cells and disorganization and scattering of cytoplasmic contents. Fungal mycelium was traceable in leaves infected by both the pathogens or C. canescens alone. Some of the characteristic changes like formation of bacterial pockets, wound periderm or cicatrice and the attack on vascular bundles was noted in case of attack by bacterium only.

670. Singh, R. and Mall, T.P. 1973. Changes in agronomic characters and contents of mung bean (Phaseolus aureus Roxb.) infected with arhar mosaic virus. Acta Agronomica Universidad National de Colombia, 23: 51-65.

Infected plants had lower dry weight but higher moisture content than healthy plants. Infection reduced the protein content in seed, leaf and stem. In healthy roots and those inoculated with AMM the protein content was the same.

671. Singh, R. and Mall, T.P. 1974. Studies on the nodulation and nitrogen fixation by infected leguminous plants. I. Effect of arhar mosaic virus infection on nitrogen value, nodulation and nitrogen fixation by some pulse crops. Plant and Soil, 41: 279-286.

The arhar mosaic virus strains ASM and AMM reduced the growth and fresh weight of infected plants of cowpea, mung and urd bean. Dry weight of infected mung and urd plants increased but that of cowpea decreased. The disease decreased the number, weight and size of nodules in cowpea and mung but increased number and fresh weight in urd. Total N in infected cowpea and mung plants was lower than in healthy ones but was higher in urd plants. The strains reduced nitrogen fixation capacity.

672. Singh, R. and Mall, T.P. 1974. Physiology of Phaseolus mungo L. affected with urd mosaic virus I. Effect on chlorophyll content, catalase and peroxidase activity. Portugaliae Acta Biologica, 13: 63-71.

In leaves of 10 urd cultivars the virus caused a decrease in chlorophyll content and catalase activity and an increase in peroxidase activity. The cultivars varied in susceptibility.

673. Singh, R. and Mall, T.P. 1974. Physiology of Phaseolus mungo L. affected by urdbean mosaic virus. II. Effect on carbohydrate and phosphorus. Phyton , Austria, 15: 235-238.

Phosphorus and carbohydrate contents of urd bean plant infected by urd bean mosaic virus was greatly affected.

674. Singh, R. and Roy chowdhury, J. 1983. Influence of the infection by common bean mosaic virus on nodulation and nitrogen fixation by mung bean (Vigna radiata (L.)Wilczek). Rivista de Agricultura Subtropicale, 77: 249-257.

As a result of infection by bean common mosaic virus, nodule formation was delayed on secondary roots; the number, size and fresh weight of nodules were reduced but the dry matter contents was increased. Total nitrate and nitrite nitrogen & protein were increased while amonical nitrogen, carbohydrate fraction, organic carbon, C:N, leghaemoglobin and bacterial population in nodules & media were reduced.

675. Singh, R. and Singh, R. 1975. Studies on a mosaic disease of urd bean (Phaseolus mungo). Phytopathologia Mediterranea, 14: 55-59.

Three strains of bean southern mosaic isolated from P. mungo exhibited similar host range. DEP was 10^{-3} to 10^{-4}, TDP 70 to 80°C and longevity in vitro at 5 to 7°C was 65 to 72 days. Isolates also remained infective in P. mungo leaves desicated over $CaCl_2$ for 426 to 634 days at 12 to 40°C. The strains were transmitted by sap, but not by seed or aphids.

676. Singh, R. and Singh, R. 1978. Studies on mosaic causing disease of urdbean, Indian Journal of Mycology & Plant Pathology, 8: 185-187.

Incidence of UBMV is the major constraint in increasing urd production in eastern U.P. A sap transmissible virus disease of urdbean has been reported. It differed from cowpea mosaic virus, urd mosaic virus, black gram virus, urd crinkle virus & SBMV.

677. Singh, R. and Singh, R.B. 1978. Changes in enzymatic activity of mung bean leaves due to mung bean severe mosaic virus infection. Legume Research, 2 :53-55.

Peroxidase and catalase activities were higher and lower, respectively, in infected V. radiata leaves than in healthy leaves. Both activities increased upto the 80th day after inoculation, thereafter declined. Symptom severity was also observed to increase upto the 80th day and then became moderate.

678. Singh, R. and Singh, R.B. 1979. Changes in chlorophyll contents, primary productivity and carbohydrate fractions of mung bean due to mung bean severe mosaic virus infection. Indnian Journal of Plant Pathology 15: 55-63, 83.

The chlorophyll content and rates of net and gross production, fell in diseased leaves, while the respiratory loss rose. Reducing and non reducing sugars, total sugars and starch decreased in infected leaves, stems and roots at every stage of infection of mung bean by severe mosaic virus.

679. Singh, R. and Singh, R.B. 1983. Changes in chemical composition of mungbean fruits due to mungbean severe mosaic virus infection. Indian Phytopathology, 36: 129-131.

Total sugars, reducing sugars, non reducing sugars, total nitrogen, protein, nitrate nitrogen, total free aminoacids and inorganic phosphorus were higher in diseased fruit parts than their healthy counterparts. However, starch, ammonical nitrogen, organic phosphorus and total phosphorus was less.

680. Singh, R. and Srivastava, R.S. 1983. Effect of nitrogen nutrition and Rhizobium on multiplication and symptom expression of common bean mosaic virus in mung bean. Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz, 90: 207-212.

Activity of bean common mosaic virus was higher in Rhizobium treated than untreated Vigna radiata plants. The increase was associated with increasing supply of nitrogen upto 784 ml/l. In both treated and untreated plants symptoms were most severe at 168 and 224 ml/l, respectively. The level (784 ml/l) which produced maximum activity did not increase symptoms severity in the host. Symptoms appeared earlier in untreated than treated plants.

681. Singh, R.A., Amin, K.S. and Gurha, S.N. 1986. Sources of resistance to yellow mosaic virus in mung bean & urd bean. Proceedings National Seminar on whitefly transmitted Plant virus diseases, IARI, New Delhi, pp. 35.

Varieties and lines of urd bean and mung bean found resistance against MYMV are identified.

682. Singh, R.A. and Gurha, S.N. 1980. Disease problems of some important pulses and propects of their control. Pesticides Annual : 81-85.

The diseases of black gram and green gram caused by viruses, bacteria and fungi are described in detail with regard to symptoms and control. The viral diseases include yellow mosaic, leaf crinkle, mosaic mottle & leaf curl. Bacterial leaf spot (X.phaseoli) is described in brief. Amongst fungal diseases , Cercospora leaf spot, powdery mildew, charcoal rot/ root rot, anthracnose, rust, leaf blight (R.solani) are described. Diseases of cowpea are also included.

683. Singh, R.A., Gurha, S.N., Misra, D.P. and Gangal, L.K. 1980. Role of systemic insecticides in augmenting yield with reduced yellow mosaic virus incidence in mungbean. Indian Plant Protection Journal, 8(2): 167-169.

Aldicarb applied in furrows at the time of sowing (1 kg a.i./ha) resulted in minimum plant infection of mung bean by MYMV. It increased 120% yield over control and gave a net profit of Rs.2107/ha.

684. Singh, R.A., Gurha, S.N. and Sahambi, H.S. 1981. Diseases of Kharif pulses. Indian Farming Special issue on pulses. Aug. 1981.

Diseases of pulses i.e. arhar, mung, urd & cowpea are described with symptoms and control. Mung,urd diseases include Cercospora leaf spot, charcoal rot/root rot, anthracnose, powdery mildew, rust, Rhizoctonia leaf blight, yellow mosaic, leaf

crinkle and bacterial leaf spot. General account of each disease is given to facilitate identification and control.

685. Singh, R.A., Sahambi, H.S. and Gurha, S.N. 1982. Investigations on yellow mosaic of urd bean (Vigna mungo) with particular reference to yield losses & sources of resistance. Indian Journal of Mycology & Plant pathology, 12: 115.

Pantnagar, Bareilly, Kanpur and Lalitpur were the hot spot for yellow mosaic of urd bean. The disease significantly reduced number of pods and yield specially at 25% infection level. It prolonged the maturity of crop by 10-15 days and delayed harvesting of infected plants, decreased the yield loss to the tune of 16%. Out of 777 germplasm types 22 were highly resistant.

686. Singh, R.M. 1972. Root knot disease of urd (P.mungo) and mung (Phaseolus aureus) in India. Indian Journal of Mycology & Plant Pathology, 2: 87.

Established pathogenicity of Meloidogyne incognita and M.javanica on mung bean and urd bean and reported their occurrence as first record in India around Lucknow. They reduced pod formation & grain yield to a greater extent.

687. Singh, R.N. 1976. Leaf curl disease of bean. FAO Plant Protection Bulletin, 24: 100-101.

A virus disease distinct from common bean mosaic, yellow bean mosaic or curly top was observed on P.mungo, P.aureus and P.vulgaris.

688. Singh, R.N.1976. Natural infection of mung bean by common mosaic virus in India. Indian Journal of Mycology & Plant Pathology, 6: 94-95.

The symptoms described produced by the isolate from P.aureus on P.mungo cultivar UPU-2, its sap, seed and aphid transimission, host range and physical properties in vitro showed it to be similar to the P.mungo isolate of BCMV.

689. Singh, R.N. and Nene, Y.L. 1977. Factors affecting symptom expression and incubation period of BCMV in urdbean. Indian Journal of Mycology & Plant Pathology, 7: 111-114.

Symptom expression & incubation period of BCMV in urdbean is affected by the stage of test plants, inoculum potential, salt concentration and pH of the buffer used for extraction of infective sap & temperature during and after inoculation of plants. Optimum conditions favouring fullest expression of symptoms & shorter incubation period, are inoculation of test plants at 3rd trifoliate stage with standard inoculum of 10^{-2} dilution extracted in potassium phosphate buffer of 7.6 pH & 0.2 molarity. Placing the inoculated plants at 22-26°C results in earlier severe symptoms.

690. Singh, R.N. and Nene, Y.L. 1977. Diagnostic symptoms of mosaic mottle disease of urd bean (Phaseolus mungo L.). Seeds & Farms, 3:23-25.

Diagnostic symptoms of the disease have been described, and the factors affecting the symptoms are mentioned.

691. Singh, R.N. and Nene, Y.L. 1978. Further studies on the mosaic mottle disease of urd bean. Indian Phytopathology, 31: 159-162.

The *in vitro* properties of the virus of systemic mottle in urd bean is described in extract: TIP between 55°C and 60°C, DEP between 5×10^{-3} and 10^{-4}; longevity *in vitro* at 24°C between 36-48 hrs. The host range is restricted to a few legumes. It is transmitted by *Aphis craccivora* and *A.gossypii*, and is serologically related to common bean mosaic virus.

692. Singh, R.N., Nene, Y.L. and Srivastava, S.K. 1983. Evaluation of urd bean & mung bean genotypes for resistance to bean common mosaic virus and losses caused by the disease. Legume Research, 6:69-73.

The reaction of urd & mung cultivars to the virus is tabulated. Sap inoculation with BCMV induced severe disease in 66.07% of urd genotypes as compared to 2.77% in mung. There was no ~~xx~~ correlation between field susceptibility and response to sap inoculation in green house.

693. Singh, R.P. and Singh, D.R. 1973. A new leaf spot of urd (P.mungo L.). Indian Journal of Farm Science, 1(1): 115.

694. Singh, R.R. and Shukla, P. 1986. Cultural studies on Colletotrichum truncatum causing anthracnose of black gram. Indian Journal of Mycology & Plant Pathology, 16: 172-174.

C.truncatum causes anthracnose of black gram of which seed get infected locally or systemically. Fungus from black gram seed was pathogenic. Kirchoff's medium was best for growth and sporulation. Acervulii production was good on media on which growth was best as well as poor. For growth 30°C and sporulation 20°C temperature was best. Though fungus grew at pH 3.0- 9.0 but optimum pH was 5.5-7.5.

695. Singh, R.R. and Shukla, P. 1986. Sources of resistance to leaf blight of black gram ~~xx~~ caused by Colletotrichum truncatum. Indian Journal of Plant Pathology, 4: 105-107.

Out of 609 entries of urdbean only 2 germplasm lines (112 and BR 10) and 6 cultures were moderately resistant. All commercial varieties were susceptible.

696. Singh, R.R. and Shukla, P. 1987. Aminoacid changes in black gram leaves infected with Colletotrichmm truncatum. Indian Phytopathology, 40: 241.

Concentrations of arginine, glutamic acid, histidine, lysine, metheonine, phenylalanine, theonine and valine were reduced in leaves of black gram due to infection by C.truncatum. On the other hand, concentrations of cystine and proline were increased.

697. Singh, R.S. and Sekhon, P.S. 1988. Effect of Epicoccum purpurescens on Macrophomina phaseolina causing seedling blight and charcoal rot of mung bean. Indian Phytopathology, 41: 248-249.

Culture filterate (80%) of E.purpurescens inhibited germination of pycniospores of M.phaseolina completely, reduced the germ tube length, inhibited mycelial growth and delayed sclerotia formation. E.purpurescens also inhibited infection of mungbean seedlings as well as adult plants by M.phaseolina.

698. Singh, R.S. and Singh, S. 1986. Interaction of some isolates of Epicoccum purpurescens with Macrophomina phaseolina. Plant Disease Research, 1: 35-40.

Eighteen isolates of E.purpurescens (E.nigrum)were grouped into 4 on the basis of colony characters, sporulation and production of antagonistic compounds. Isolates of group III were most effective in checking sporulation and germination of M.phaseolina and in checking disease development on mung bean. Group I & IV were intermediate while II was least effective.

699. Singh,R.S., Thind, T.S. and Sekhon, P.S. 1984. Biocontrol of charcoal rot of mung bean caused by Macrophomina phaseolina. Indian Journal of Mycology & Plant Pathology, 14: VII.

Epicoccum purpurescens was strongly antagonistic against M.phaseolina from mung bean. Culture filterate of antagonist inhibited germination of

M.phaseolina. It also inhibited disease development in unsterilized soil suppressing inoculum upto five months.

700. Singh, Shamser, Bisht, I.S. and Dobas, B.S. 1987. Screening of urd bean (Vigna mungo) germplasm for field resistance to yellow mosaic virus. Indian Journal of MYcology & Plant Pathology, 17:216-217.

Scoring of germplasm lines was done on the basis of symptom severity and effects on plant growth. In all 47 entries were found free from the disease under field conditions.

701. Singh, Surjeet and Shrivastava, M.P. 1985. Assessment of yield losses in mung bean due to Myrothecium. Agricultural Science Digest, India. 5:114-115.

Three cultivars of V.radiata inoculated with $1x10^5$ spores per ml of M.roridum showed T 44 most resistant with 2.6% yield loss & 34.4 disease index. In K 851 & Varsha these values were 7.6% & 50.6% and 59.2%, respectively. It was due to reduction in pod number, 100 seed weight was not affected.

702. Singh, S.A. 1984. Two fungi attacking pulse crop. FAO Plant Protection Bulletin, 32:112.

Leaf spot on V.mungo caused by Phoma exigua is a new disease and Phaseolus calcaratus is a new host of Uromyces appendiculatus in India.

703. Singh, S.D. and Naik, S.M.P. 1976. Field control of powdery mildew of urd by fungicides. Indian Journal of Mycology & Plant Pathology, 6: 99.

In trials of P.mungo maximum control of Erysiphe polygoni was obtained with calixin, followed by bavistin and thiovit.

704. Singh, S.N. and Agrawal, S.C. 1987. Chemical control of Myrothecium leaf spot and pod blight of soybean. Indian Journal of Plant Protection, 15: 31-33.

Mancozeb gave best control of leaf spots as well as pod blight of soybean and resulted in maximum soybean yield and seed index. Two sprays were done at an interval of 12-15 days starting from appearance of the diseases. The fungicide is expected to control the leaf spot in mung bean.

705. Singh, S.N., Agrawal, S.C. and Khare, M.N. 1986. Efficacy and cost benefit ratio of certain fungicides against foliar diseases of mung bean (Vigna radiata L.) Indian Journal of Plant Protection, 14: 63-65.

Two field trials were conducted to evaluate 11 fungicidal sprays. Dinocap gave best control of powdery mildew resulting in maximum yield and cost benefit ratio. Carbendazim was most effective against anthracnose and leaf blight but had less benefit ratio as compared to captan & Mancozeb.

706. Singh, S.N. and Roy, A.K. 1979. An addition to Indian soil fungi. Geobios, 6: 96.

Penicillium patulum is newly reported in the rhizosphere of Phaseolus aureus.

707. Singh, S.N. and Srivastava, S.K. 1987. Effect of phosphorus application on the severity of some important foliar diseases of mung bean and urdbean. Agriculture Science Digest, 7: 47-51.

Foliar diseases caused by Myrothecium roridum, M.phaseolina, Cercospora sp. & E. polygoni in mung bean and Colletotrichum sp., M.phaseolina and E.polygoni on urdbean were increased with higher doses of P_2O_5 (100 kg/ha). However, the P_2O_5 increased the yield also in both the crops.

708. Singh, V. 1977. Studies on Colletotrichum Corda species associated with urd (P.mungo) seeds. M.Sc. Ag. Thesis, JNKVV, Jabalpur, pp.98.

Seed borne fungi of urd detected were several including Colletotrichum graminicola (36%) and

C.truncatum (5%). Out of 6 methods tested 2,4-D blotter method was the best while modified blotter method (water pH 6), modified deep freezing blotter method in which blotters are dipped in Agrimycin 100 and streptomycin sulphate gave the higher counts of Colletotricum sp. The fungus caused damage to the crop attacking seed, hypocotyl, leaf and pods. The pathogen was extra and intra embryal. The seed germination was reduced by the metabolites produced by both the fungi. The seed infection reduced protein contents. In the in vitro and in vivo tests, thiabendazole and Agrosan GN were effective. Hot water treatment at 58°C for 15 min. checked the seed borne Colletotricum upto 100% and increased germination by 17%.

709. Sinha, R.K. 1979. Effect of seed borne fungi on the protein content of urd seeds (P.mungo L.) under different relative humidities. Proceedings II Botanical Conference, 18 pp.

Protein content of infected seeds was analysed at different RH. Maximum changes occured at 96% RH. Seeds from which fungal mycelium was removed showed continueous deplition in protein whereas in cases of seeds having intact mycelium considerable rise & fall in protein value under different incubation period was noted.

710. Sinha, R.K. and Prasad, T. 1981. Effect of fungal metabolites on seed germination, mycobial association and seedling growth of mung. Indian Phytopathology, 34: 515-517.

Culture filtrates of Aspergillus flavous, A.niger & Penicillium sp. had phytotoxic effect on all the three varieties of mung seeds while filtrate from A.alternata, C.lunata, H.oryzae increased seed germination. In general, culture filtrate of all test fungi reduced the fungal incidence.

711. Sinha, R.K. and Roy, A.K. 1981. Changes in seed contents of mung (Vigna radiata) due to Aspergillus flavcus infestation at different relative humidities. Indian Phytopathology, 34: 119 (Abstr.).

Artificial infestation of mung seed by A.flavous resulted in depletion in protein and starch contents at 75 & 96% RH while at lower levels of RH changes were insignificant. Soluble nitrogen exhibited fluctuating trend at these RH at different incubation periods.

712. Sittiyas, P., Poehlman, J.M. and Sehgal, O.P. 1979. Inheritance of resistance to CMV infection in mung bean. Crop Science, 19: 51-53.

Resistance to CMV-M in mungbean was conditioned by a single dominent gene(Cmm) which was not linked with colour of seed, texture layer or colour of seed coat. Yield due to disease in field was reduced by more than 50%.

713. Sivaprakasam, K. 1983. Efficacy of some chemicals in the control of black gram (Vigna mungo (L.)Hepper) powdery mildew (Erysiphe polygoni DC). Madras Agricultural Journal, 70(2): 95-96.

The best control was given by benlate and sulphur fungicides. Application of sulphur dust & wet formulation increased the yield by 47.3 and 45.9%, respectively and resulted in a net profit of Rs.200/- & 187/- per hectare.

714. Sivaprakasam, K., Anavalagan, K.R., Ramakrishnan, C. and Radhakrishnan, T. 1983. Influence of NPK on Cercospora leaf spot incidence of mungbean. Pulse Crops Newsletter, 3: 52-53.

N&P when applied to mungbean cultivar CO_3 highly susceptible to Cercospora leaf spot, showed severe disease but addition of potash @ 20 kg/ha reduced the disease significantly. Spacings did not have any significant effect.

715. Sivaprakasam, K., Anabalagan, R., Rajendran, R. and Radhakrishnan, T. 1983. Influence of NPK nutrition on incidence of yellow mosaic in urdbean. Pulse Crops Newsletter, 3: 55-56.

The N,P,K treatments 50:100:0 followed by 50:100:50 kg/ha recorded severe yellow mosaic but 50:100:50 was at par with 25:50:0 kg indicating the counteracting effect of potassium at higher doses of N&P.

716. Sivaprakasham, K., Jagadeesan, M., Kannapiran, C. and Pillayarsamy, K. 1976. Changes in the mineral content of black gram leaves due to leaf crinkle virus. Madras Agricultural Journal, 63: 123-125.

In the P. aureus var. 1-65 leaves infected with black gram leaf crinkle virus the phosphorus and potassium were increased while nitrogen, calcium and magnesium were reduced considerably.

717. Sivaprakasam, K. and Marimuthu, T. 1982. Fungicidal control of Cercospora leaf spot of mung bean. Indian Phytopathology, 35: 330-331.

Best control of the disease was obtained under two sprays of bavistin 0.05% + DM-45 0.2%. Bavistin 0.05% or benlate 0.05% were equally good. Maximum increase (30.6%) in yield was noted in bavistin 0.05% followed by bavistin + DM-45.

718. Sivaprakasam, K., Marimuthu, T., Radhakrishnan, T. and Vairavan, K. 1981. Influence of date of sowing and spacing on the incidence of powdery mildew of green gram and black gram. Madras Agricultural Journal, 68: 65-67.

The incidence of E. polygoni in mung and urd was higher in 60-80 day old plants than in those 40 day old. Disease was more severe in closely planted than wide spaced crop.

719. Sivaprakasam, K., Pillayarsamy, K., Rajamani, A. and Souminirajagopalan, C.K. 1974. Evaluation of black gram (Phaseolus mungo L.) and green gram (P. aureus Roxb.) varieties for resistance to yellow mosaic virus of green gram. Madras Agricultural Journal, 61: 1021-1022.

Field reaction to yellow mosaic virus of mung bean is tabulated. Out of 122 lines 25 were resistant to MYMV.

720. Sivaprakasam, K., Pillayarsamy, K., Rajamani, A. and Rajgopalan, C.K.S. 1976. Note on the evaluation of black gram (P. mungo) and green gram (P. aureus) varieties for resistance to powdery mildew (Erysiphe polygoni). Madras Agricultural Journal, 63:139-140.

None of the varieties tested, was resistant.

721. Sohi, H.S., Jain, S.S., Sharma, S.L. and Varma, B.R. 1964. New records of plant diseases from Himachal Pradesh. Indian Phytopathology, 17: 42-45.

A severe wilt of black gram caused by Fusarium sp. was reported from solan. In initial stages lower leaves of the plant changed yellow in colour while the upper leaves discoloured and withered resulting in severe sheding later. The root system was normal initially but developed rotting and discolouration of secondary roots at advanced stages.

722. Sohi, H.S., Sharma, S.L. and Nair, S.K. 1972. New records of fungi from Himachal Pradesh. IV. Research Bulletin Punjab University, 23: 109-111.

Among nine fungi recorded were Mycosphaerella pinodes on urdbean.

723. Sohi, H.S., Sharma, S.L. and Sachdev, K.B. 1966. Powdery mildew from Himachal Pradesh. I. Indian Phytopathology, 19: 235-237.

Reported Sphaerotheca macularis on leaves of P. mungo causing powdery mildew.

724. Solhein, W.G. and Stenvens, F.L. 1931. Cercospora studies II. Some tropical Cercosporae. Mycologia, 23: 365-405.

The taxonomic position of Cercospora cruenta infecting leaves, stem and pods of P.mungo is described.

725. Soni, P.S. and Thind, B.S. 1987. Detection of Xanthomonas campestris pv. vignicola (Burkh.) Dye from cowpea seeds and X.campestris pv. vignaeradiatae (Sabet et al.) Dye from mungbean seeds. Phytopathologia Mediterranea, 26: 1-6.

Under conditions favourable for disease development (during monsoon) the traditional growing test was effective but during summer the incubation growing on test was effective in detecting pathogen on mung bean seed. Symptoms appeared in 12-15 and 10 days respectively in above tests. Wounded seeds growing on test was effective for detecting minimum level of inoculum but not suitable for determining percentage of infection.

726. Sood, A.K., Shyam, K.R. and Singh, B.M. 1981. Comparative epidemiological competence of Cercospora canescens & C.cruenta in urdbean. III. International symposium on Plant Pathology, IPS, New Delhi, pp.111.

C.canescens appear later than C.cruenta but becomes predominant later on. Optimum temperature for spore germination of both was 25°C but C.cruenta had higher germination at 35°C. In C.canescens speed of germination was greater than C.cruenta at 25 & 30°C. The average infection efficiency of C.cruenta was greater than C.canescens. Spore production was 3-4 times more on leaf tissues in C.canescens but for both pathogens optimum temperature (30°C) & temp. range (15-40°C) for spore production was same. It makes C.canescens the more dominant pathogens than C.cruenta.

727. Sood, A.K., Thind, B.S. and Singh, N. 1976. Occurrence and control of bacterial leaf spot of mung (Phaseolus aureus Roxb.) in the Punjab State. Journal of Research, Punjab Agricultural University, 13: 182-185.

The mung strain of X.phaseoli is seed-borne and infection was reduced by seed treatment with captan (0.3%) and bleaching powder (0.025%). Three protective sprays of streptocycline (100 ppm), Zineb (0.3%) or benomyl (0.2%) were effective in controlling secondary infection.

728. Sood, A.K., Thind, B.S. and Singh, N. 1976. In vitro evaluation of some antibiotics and fungicides against Xanthomonas phaseoli, causal agent of leaf spot of mung (Phaseolus aureus). Hindustan antibiotic Bulletin, 18: 119-120.

Fungicides and antibiotics were screened against X.phaseoli in vitro and effective ones have been mentioned.

729. Soria, J.A. and Quebral, F.C. 1973. Occurrence and development of powdery mildew on mongo. Philippine Agriculturist, 57: 153-177.

Incidence of E.polygoni on P.aureus was maximum in January when montly means of temperature, R.H., wind velocity and total solar radiation and rainfall were 25.6°C, 85%, 1.8 mph, 9976 g-cal-cm^2 days and 1.61 inch, respectively. A forecasting system based primarily on the relationship between disease appearance and host age was devised. It is revealed to plant P.aureus at a time so that vegetative growth does not coincide with environmental conditions favourable for powdery mildew. Protectant fungicides should be applied before a build up of conidia occurs in the area.

730. Sprague, R. 1935. Ascochyta boltshauseri on beans in Oregan. Phytopathology, 25: 416-420.

P.aureus was susceptible to all the three species of Ascochyta found on pea i.e. A.pisi, A.pinodes and A.pinodella.

731. Srivastava, K.M. , Verma, G.S. and Verma, H.L.1969. A mosaic disease of black gram (Phaseolus mungo). Science & Culture, 35: 475-476.

A virus causing mottling and reduction in size of the leaves, stunting of the plants and reduction in yield was isolated from P.mungo. It was transmitted mechanically and not by Myzus persicae or Aphis gossypi. It differed in host range and physical properties from a mosaic virus previously reported on P.mungo in India.

732. Srivastava, M.P. 1960. Occurrence of Myrothecium leaf spot of mungbean in Haryana. Indian Phytopathology, 33: 137.

Disease was characterised by oval or circular fading green or light brown to brown spots with concentric zonation and sporodochia. It was due to Myrothecium roridum and was severe where crop was taken in orchard or field surrounded by dense fruit trees or infested with weeds. It was severe in crops near cotton or cowpea.

733. Srivastava, M.P. and Singh, Surjeet 1985. Studies on survival of Myrothecium roridum Tode ex Fr. National Academy of Sciences Letters, India,8(1):3-4.

The fungus could survive on infected V.radiata leaves for 9½ months and on crop residues in soil for 7-8 months, depending upon the season of crop growth and environmental factors. Soil is thus one of the most important potential sources of inoculum.

734. Srivastava, R.C., Khan, M.S. and Lal, M.P. 1978. Some new leaf spot fungi from India. Indian Phytopathology, 31: 524-525.

Myrothecium roridum reported as a new record in India on P. mungo from Darana district Jaunpur.

735. Staples, R.R. 1958. Report of the Department of Research and Specialist Services of Southern Rhodesia for the year 1957. Report of Ministry of Agriculture, Rhodesia, Nyasaland. 1956-57:7-86.

Ascochyta phaseolorum is reported to cause leaf spot on P. aureus besides other hosts in Mazoo valley.

736. Subramanian, C.L., Marimuthu, T. and Mohan, R.1980. Note on the fungicidal control of Cercospora leaf spot of green gram. MACCO Agricultural Digest, 5(8):11.

In a fungicide field test against C. canescens on P. aureus, benlate or bavistin sprayed twice at fortnightly intervals from the 30th day after sowing, effectively controlled the severe disease which occurs annually in Tamil Nadu.

737. Sud, V.K. and Singh, B.M. 1984. Effect of sowing date and row spacing on the development of leaf spot (Cercospora canescens) in urdbean. Indian Phytopathology, 37: 288-293.

Disease developed rapidly in plots with closer row spacing in Kulu-4 & HPU-6. Infection rate and disease severity were higher in early sown crop (20 June & 21 June) than in late sown crop. The late sown crop even at wider spacing produced more grain yield due to less disease than early sown crop at closer spacing.

738. Sud, V.K. and Singh, B.M. 1984. Effect of environmental factors on the development of leaf spot (Cercospora canescens) in urdbean, Indian Phytopathology, 37: 511-515.

Rapid development was favoured by a mean temperature of 22.5-23.5°C, R.H. 77-85%, sunshine hrs more than 5 per day and more number of rainy days. Interittent

rains favoured disease development. Heavy rainfall or continueous dry spells were not conducive. Infection period characterized by more number of rainy days combined with more sunshine hours were conducive for disease development.

739. Sud, V.K. and Singh, B.M. 1985. Relationship between severity of Cercospora caneseens on urd bean (Vigna mungo) and loss in grain yield. Indian Phytopathology, 38: 435-441.

The yield loss was proportional to disease serverity at flowering stage for high and low progression of disease but not more intermediate growth curves. Increase in disease severity past 50% of the flowering does not significantly alter the yield. Infection rates were poor indicators of the yield loss due to variation in the onset of epidemic. Areas under the disease progress curve was better correlated with yield loss under normal situations.

740. Suhag, L.S. 1975. Fungal flora of mung (Phaseolus aureus) seeds; pathology and control. Indian Journal of Mycology & Plant Pathology, 5: 165-168.

The fungi isolated from mung seeds were several of which species of Alternaria, Cladosporium, Fusarium and Rhizoctonia caused seed deterioration, loss in germination and seedling diseases. Agallol, Ceresan, Captan and Thirum proved better in reducing the number of associated fungi and in promoting the germination of seeds.

741. Suhag, L.S. and Suryanarayana, D. 1976. Some aspects of seed health testing with respect to seed-borne fungi of pulse crops grown in Haryana. Indian Journal of Mycology & Plant Pathology, 6:32-36.

Fungi associated with P.mungo, lentil and P.variegata seeds are tabulated and detection methods are described. Results of funcicidal seed treatments are presented.

742. Sundaraman, S. 1931. Administration report of the Mycologist. Madras for the year 1929-30: 30

Cross inoculation experiments showed that three distinct strains of M.phaseoli occur on groundnut, black gram and gingelly. The isolate of P.mungo was the most virulent. The Sclerotia remained viable at room temperature for 54 months. It caused 45% death in pot culture and was more virulent than other 2 strains.

743. Sundaraman, S. 1932. Administration report of the Mycologist Madras for the year 1930-31: 20.

Phaseolus mungo has been reported a host of Macrophomina phaseolina isolate from Sesamum.

744. Sundaraman, S. 1936. Administration report of the Mycologist, Madras for the year 1935-36: 13.

Black gram was infected by the Macrophomina isolate from horse gram.

745. Sung, J.M., Park, J.H., Lee, S.C. and Chung, B.K. 1980. The outbreak and propagule formation of black root rot caused by Calonectria crotalariae in Korea. Korean Journal of Plant Protection, 19: 228-233.

C.crotalariae cause of black root rot of soybean was very virulent in lab and could infect groundnut, V.radiata and P.vulgaris.

746. Suraj Kanta and Vaidehi, B.K. 1980. Effect of culture filtrate on the seed germination and on root & shoot elongation of Phaseolus mungo. Indian Journal of Mycology & Plant Pathology, 10:XXII(Abst.).

The culture filtrate of A.alternata, A.flavus, C.lunata, D.halodes and F.oxysporum reduced seed germination of black gram and inhibited root and shoot elongation of seedlings. Boiled culture filtrate from 30 days old was effective more. Maximum effect was noted in case of F.oxysporum and minimum in D.halodes.

747. Tai, F.L. 1936. Notes on Chinese fungi. VI. Bulletin Chinese Botanical Society II, 1: 16-28.

Sphaerotheca humuli var. fuliginuais reported to cause powdery mildew on black gram.

748. Tai, F.L. 1936. Note on Chinese fungi. VII. Bulletin of Chinese Botanical Society II, 2: 45-66.

List of 55 species of Cercospora including C.canescens on P.mungo and P.aureus and C.neovignae on P.mungo is given.

749. Tandon, R.N. 1976. Achaetomium: A new record of seed borne pathogen of P.aureus. Indian Phytopathology, 29: 464-465.

Achaetomium stnumarium Rai et al. was found associated with the seeds of mungbean. The infection was intra-embryal.

750. Taneja, M. and Grover, R.K. 1982. Efficacy of benzimidazole and related fungicides against Rhizoctonia solani and R. bataticola. Annals of Applied Biology, 100: 425-432.

Benomyl and Carbendazim were most inhibitory to all isolates of both fungi. Thiophenate methyl controlled some diseases caused by these fungi including leaf blight of mungbean (M.phaseolina). The results suggest that benzimidazole fungicides having similar toxophores act differently for disease control in different hosts and parasite combinations.

751. Tanii, A., and Baba, T. 1979. Bacterial stem rot of adzuki bean (Phaseolus radiatus var. aurea Prain) caused by Pseudomonas adzukicola A. Tanii & T. Baba nov. sp. Bulletin of Hokkaido Prefectural Agricultural Experiment Station No.42: 29-42.

A new disease of P.radiatus var. aurea affecting leaves, pods, stems and petioles has become prevalent in southern Hokkaido. It is caused by a Pseudomonas sp. resembling P.glycinea but not parasitic to soybean.

The pathogen is described as new record. Seed dressings containing 3% Kasugamycin and Cu fungicides applied soon after germination controlled the disease.

752. Tarr, S.A.J. 1954. Plant Pathology. Report of Resea-rch Division, Ministry of Agriculture, Sudan, 1951-52: 71-80

In experimental plots leaf spotting due to Ascochyta phaseolorum was present on P. mungo, Macrophomina phaseoli on P. mungo var. radiatus and typical virus symptoms were noticed on both the types.

753. Teakle, D.S. 1962. Transmission of tobacco necrosis virus by a fungus Olpidium brassicae. Virology, 18: 224-231.

The tobacco necrosis virus could be transmitted by zoospores of Olpidium brassicae in mung bean. The amount of virus infection was proportional to the number of zoospores.

754. Teakle, D.S. 1973. Use of local lesion method to study the effect of celite and inhibitors on virus infection of roots. Phytopathologische Zeitschrift, 77: 209-215.

When roots of P. aureus seedlings were rub inoculated with partially purified, concentrated preparations of tobacco necrosis or tobacco rattle virus the infection was 10^3 times more sensitive.

755. Teakle, D.S. and Hirulı, C. 1966. Vector specificity in Olpidium. Virology, 24: 539-544.

TNV was transmitted to the roots of mung bean seedlings by the lettuce strain of O. brassicae.

756. Teakle, D.S. and Yarwood, C.E. 1962. Improved recovery of tobacco necrosis virus from roots by means of Olpidium brassicae. Phytopathology, 52:359-369.

Naturally infected crop and weed roots containing O. brassicae and TNV were washed and immersed in water. Zoospores were discharged and mungbean seedlings immersed in the suspension, removed and incubated in petridishes. Lesions developed on the mungbean roots in two days.

757. Thakur, M.P. 1988. Influence of environmental condition on the incidence of anthracnose of mungbean. Indian Phytopathology, 41: 281 (Abstr.).

Anthracnose (Colletotrichum spp.) of mungbean intensity was negatively correlated with maximum and minimum temperature, the maximum disease being at 30°C and 26°C, respectively. RH 90-100% in morning & 80-93% during noon was most favourable for disease and it was positively correlated with disease intensity. Rainfall was also positively correlated and resulted in maximum disease when they were supported with high wind velocity (13 km/h). Infection was more at over cast (2) and partially cloudy weather (1) while it was less when the weather was clear.

758. Thakur, M.P. and Khare, M.N. 1989. Evaluation of mungbean varieties for resistance to anthracnose. Indian Journal of Plant Protection, 17:107-108.

Twenty seven varieties of mungbean scored against anthracnose (Colletotrichum dematium & C. lindemuthianum) differed greatly in their disease reaction. In 1986 Pusa 109 and Pusa 115 were graded as highly resistant and resistant respectively while they were susceptible and moderately susceptible, respectively during 1985.

759. Thakur, R.P., Kumar, S., Patel, P.N. and Verma, J.P. 1978. Studies on virulence of biochemical mutants of Xanthomonas phaseoli mungbean strain. Indian Phytopathology, 31: 52-56.

Biochemical mutants of X.phaseoli mungbean isolate (XMB), the incitant of bacterial leaf spot of mung bean, were isolated by nalidixicacid selection method and their virulence tested. Virulence is described on the basis of nutritional factors.

760. Thakur, R.P., Patel, P.N. and Verma, J.P. 1977. Independent assortment of pigmentation and resistance to Cercospora leaf spot in mung bean. Indian Phytopathology, 30: 264-265.

The genes governing pigmentation in PS-7 and Cercospora leaf spot resistance in EC 27087-2 and 27261-3 are monogenic dominant and no linkage exists between them.

761. Thakur, R.P., Patel, P.N. and Verma, J.P. 1977. Studies on resistance in crops to bacterial disease in India. Indian Phytopathology, 30: 217-221.

Existance of distinct pathogenic races in the bacterial leaf spot pathogen, X.phaseoli in mungbean was confirmed. The results indicated that (1) resistance in a differential to a race is governed by a single gene (2) gene governing resistance in a differential is dominant to its recessive allele governing susceptibility in another differentials (3) that a gene or allele governing resistance of susceptibility in the differentials to different races do not overlap.

762. Thakur, R.P., Patel, P.N. and Verma, J.P. 1980. Inheritance of resistance to Cercospora leaf spot in mungbean. Indian Phytopathology, 33: 377-379.

Lines EC 27087-2, EC 2761-3 and ML-1 of V.radiata were sources of resistance to C.canescens. Resistance was governed by a single dominant gene.

763. Thind, B.S. and Ish Kumar, 1980. Chemical control of bacterial and Cercospora leaf spot and leaf reddening of mungbean. Indian Journal of Mycology & Plant Pathology, 10: LXXVIII & LXXIX (Abstr.)

Bavistin 0.05% at 10 days interval 4 sprays from disease appearance were effective. For bacterial spot blitox 0.2% & streptocycline 100 ppm were also good. Bavistin was absorbed by leaves and persisted for 14 days.

764. Thind, B.S. and Krishan Kumar 1985. Chemical control of bacterial leaf spot and Cercospora leaf spot of mungbean. Indian Phytopathology, 38:601 (Abstr.).

Seed treatment either with solar heat, hot water (52°C for 30 min.), streptocycline (100 /ug/ml) + Agallol (0.2%) and streptocycline (100 /u g/ml) + captan (0.2%) before sowing coupled with a spray schedule (involving streptocycline, bavistin and blitox) effectively controlled 2 diseases & increased the yield.

765. Thind, B.S. and Krishna Kumar 1985. Chemical control of bacterial leaf spot and Cercospora leaf spot of mungbean. Indian Journal of Mycology & Plant Pathology, 15: III (Abstr.).

Seed treatment with solar heat, hot water (52°C for 30 min.), streptocycline 100 /ug/ml + Agallol (0.2%) coupled with 4 sprays of bavistin in combination with streptocycline & blitox checked bacterial as well as Cercospora leaf spot.

766. Thind, B.S., Krishna Kumar and Soni, P.S. 1984. Eradication of Xanthomonas campestris pv. vignaeradiatae from mungbean seeds by physical and chemical treatments Indian Journal of mycology & Plant Pathology, 14:8 (Abst).

767. Thirumalachar, M.J. and Mishra, J.N. 1953. Some diseases of economic plants in Bihar, India. FAO Plant Protection Bulletin, 10: 145-146.

The diseases included were Myrothecium roridum leaf spot of mung bean.

768. Thomas, H.R. and Zaumeyer, W.J. 1950. Red node, a virus disease of beans. Photopathology, 40:832-846.

Red node virus which is a strain of tobacco streak virus has its host range including P. mungo & P. aureus.

769. Thongmeearkom, P., Honda, Y., Saitó, Y. and Syamananda, R. 1981. Nuclear ultrastructural changes and aggregates of viruslike particles in mungbean cells affected by mungbean yellow mosaic disease. Phytopathology, 71: 41-44.

Yellow mosaic disease of V. radiata in Thailand was caused by a whitefly (B. tabaci) transmitted agent, presumably a virus. The particles (VLPs) associated with the disease were isometric 15-20 nm diameter, and often formed loose aggregates that sometimes almost filled the total nuclear volume of infected phloem cells. Infected V. radiata had hypertrophied nucleoli, aggregates of VLPs and fibrillar bodies in the nuclei of pholem cells as early as 2 days before symptoms appearance. In vacuoles or lumena of the partially or fully differentiated sieve elements, VLPs occasionally formed aggregates leaving a double cylindrical arrangements of particles. No VLPs were detected in tissues other than the phloem.

770. Thongmeearkom, P., Kittipakorn, K. and Surin, P. 1981. Outbreak of mungbean yellow mosaic disease in Thailand. Thai Journal of Agricultural Sciences, 14:201-206.

A heavy outbreak of mungbean yellow mosaic virus on V. radiata in 1977 was favoured by increase in acreage of the crop and by unusually dry condition which allowed a population build up of the vector, B. tabaci.

771. Tiwari, Anamika and Kotasthane, S.R. 1984. Chemical control of fungal foliar diseases of mung. Indian Phytopathology, 37: 383 (Abstr.).

Powdery mildew, Macrophomina leaf blight and Cercospora leaf spot could be controlled by 2 sprays with bavistin increasing yield. Baylatan controlled only powdery mildew.

772. Tiwari, A. and Kotasthane, S.R. 1986. Chemical control of fungal foliar diseases of mungbean. Pesticides, 20(12): 47-48.

The effect of 9 fungicides on diseases of mung caused by E.polygoni, C.canescens, C.cruenta and M.phaseolina was observed. Least disease and highest yields were obtained with 2 sprays of bavistin 0.05%.

773. Tiwari, A.S. 1977. Mungbean varietal requirement in relation to cropping seasons in India. I International Mungbean Symposium, AVRDC, Taiwan: 129-131.

In Kharif sole crops of mungbean, MYMV and leaf crinkle virus occurred. MYMV occurred only in Northern and Central India including M.P. & U.P. Urd Pant U-26 was resistant at Gwalior under field conditions to MYMV. L-24-2 was tolerant in Punjab. Other diseases were leaf spots by M.phaseoli, & C.canescens and root rot caused by R.solani and Macrophomina sp. Powdery mildew may cause total crop failure in winter.

774. Toledo, R.R. and Davide, R.G. 1969. Reactions of different vegetable and field crops to infection by Meloidogyne javanica. Philippine Phytopathology, 5: 45-51.

Reported M.javanica causing root knot on mungbean.

775. Tolmacheva, E.A. 1966. Viruses of legumes in the Central Botanical Garden of Byelorussian Academy of Sciences. Vestsi Akad. Navuk BSSR, Ser, biyal. Navuk, 4: 125-129.

The viruses identified by inoculation of indicators were bean mosaic on bean and mung bean.

776. Tripathi, H.S. and Beniwal, S.P.S. 1977. Anthracnose of urdbean caused by Colletotrichum capsici. Indian Phytopathology, 30: 273-274.

Anthracnose of urdbean caused by C. capici was recorded in Pantnagar U.P. as a first record. Symptoms include spots on leaves finally producing shot holes and spots on pods.

777. Tripathi, R.K., Bohra, K. and Beniwal, S.P.S. 1975. Changes in phenoloxidase and peroxidase activities and peroxidase isoenzymes in yellow mosaic virus infected mungbean (Phaseolus aureus L.). Indian Journal of Experimental Biology, 13: 513-514.

Diseased leaves of both the susceptible H-45 and tolerant LM-170 showed higher activities of polyphenol oxidase and peroxidase. Both starch gel electrophorasis and DEAE-cellulose column chromatography indicated more protein peaks and isoperoxidase in diseased than in healthy leaves ofLM-170.

778. Tripathi, R.K.R. and Tripathi, G. 1983. Assay on NR activity in Vigna radiata infected by broad bean mosaic virus (BBMV). Legume Research, 6:43-44.

The nitrate reductase activity in healthy & BBMV infected V. radiata plants is tabulated.

779. Tripathi, R.K.R., Gripathi, G., Singh, K.B. and Kumar, S. 1983. Effect of broad bean mosaic virus on nitrate reductase activity in Vigna mungo cv. Type-9. National Academy Science Letters, 6(2):41-42.

Infection caused a significant increase in activity of the emzyme in all parts of the plant.

780. Tseng, T.C. and Chang, L.H. 1974. Sclerotium rolfsii phosphatidase BI inhibition of mungbean mitochondrial oxygen uptake by phosphatidase. Botanical Bulletin of Academia Sinica, 15: 8-13.

Crude and purified enzyme inhibited oxygen uptake in mung.

781. Tsuchiya, S., Yanagawa, M. and Ogoshi, A. 1986. Formae speciales differentiation of Phytophthora vignae isolates from cowpea and adzukibean. Annals of the Phytopathological Society of Japan, 52:577-584.

Isolates of stem rot pathogen from Phaseolus radiatus var. aurea and from cowpea were host specific. The insoluble protein and isoenzyme patterns of these isolates, compared by zone electrophoresis, showed no quantitative differences between V. radiata and cowpea isolates. Hence, two different f. species are proposed on the basis of their specific pathogenicity: P. vignae f. sp. adzukicola for that on V. radiata & P. vignae f. sp. Vignae for that on cowpea. Three races were recognized within f. sp. adzukicola.

782. Tsuchizaki, T. 1986. Partial characterization and serological relationship of 3 poty viruses isolated from leguminous crops in Thailand. In International Symposium on virus diseases of rice and leguminous crops in tropics, Japan; 115-120.

Two isolates of BCMV from mung bean in Thailand were transmitted by aphids and through mungbean seeds. Mechanical inoculation caused systemic infection in plants of leguminosae only. BCMV from Thailand was flexuous filaments 750 nm in length & reacted strongly with antiserum of BCMV isolated from bean in Japan. In double diffusion tests in agar gel containing 0.5% lithium 3, 5 diiodosalicylate, BCMV and BlCMV (from asparagus bean) were serologically identical and SMV was serologically related to but distinct from BCMV and BlCMV.

783. Tsuchizaki, T., Iwaki, M., Thongmeearkom, P. Sarindu, N. and Deema, W. 1986. Bean common mosaic virus isolated from mungbean (Vigna radiata) in Thailand. Technical Bulletin of the Tropical Agricultural Research Centre No.21: 184-188.

A strain of BCMV was characterized and identified from mungbean.

784. Tyagi, R.N.S., Mathur, A.K., Gaur, V.K., Chitley, K., Bansal, R.K. and Pathak, A.K. 1988. Pathological status of pulse crops in Rajasthan. Indian Phytopathology, 41: 280 (Abstr.).

Beside other pulse crops web blight (Thanatephorus cucumeris), leaf spots (Cercospora spp., Colletotrichum truncatum, Protomycopsis spp., Xanthomonas sp.) and powdery mildew (E. polygoni) have been reported on mungbean and urdbean in Rajasthan. Macrophomina blight caused 24.07% loss in yield of mungbean. Resistant varieties of mung and urdbean have been tabulated.

785. Uozumi, T. and Yoshii, H. 1953. Some observations on the mildew fungus affecting the cucurbitaceous plants. Annals of the Phytopathological Society of Japan, 16: 123-126.

Sphaerotheca fuligena which causes powdery mildew of cucurbits in Fukuoka, Japan is pathogenic to P. radiatus as well.

786. Utikar, P.G., Deshmukh, R.B. and More, B.B. 1978. Field reaction of black gram (Vigna mungo (L.)Wilczek) germplasm to powdery mildew. Tropical Grain Legume Bulletin, 13/14: 30-31.

Data are presented on the reactions of 87 lines to Erysiphe polygoni. None was immune but P_{20}B, P_{161}, P_{20}A, P_{134}, P_{17}A, P_{153} & P_{47} were resistant in early Types. Nine were resistant in late types.

787. Vaheeduddin, S. 1955. Phytophathological survey of Hyderabad State. Indian Phytopathology, 8:166-171.

Reported E. polygoni on Phaseolus spp. or allied pulses.

788. Van Hall, C.J.J. 1921. Diseases and pests of cultivated plants in the Dutch Indes during 1921. Meded. Inst. Voor Plantenzeikten, 53: 46.

Besides diseases of other crops, leaf curl of urd bean is recorded and damage caused is described.

789. Varma, Anupam 1985. Natural occurrence of cowpea mildmottle virus in Vigna mungo. Indian Phytopathology, 38: 626 (Abstr.).

Recently a sap transmissible virus was isolated from naturally infected urdbean plants showing mottling and smalling of leaves. It has different host reaction & particle morphology than those recorded earlier on urdbean. Serologically it was found related with cowpea mildmottle virus.

790. Varma, G.S., Verma, H.N. and Srivastava, K.N. 1969. Studies on the virus diseases of pulse crops in Lucknow and its sub urbs (urd, mung, arhar, peas, beans, soybean, lobia). Proceedings 3rd Annual Workshop Conference on Pulse Crops, New Delhi; 117-123.

Virus diseases of pulse crops including mungbean & urdbean, occurring around Lucknow are described in brief.

791. Varma, J.P., Kadian, O.P. and Singh, J.P. 1973. Occurrence & incidence of virus diseases of mung and urd in Haryana. Indian Phytopathology, 26:592-594.

Observations on disease incidence of yellow mosaic & mosaic on mungbeans and urdbeans are described. Mungbean suffers more as compared to urdbean. The disease is more severe on summer crop than on Kharif and Mung No.54 & urd Mash-1-1 had less disease.

792. Varma, K., Sareen, V.N.S. and Singh, R.1976. The effect of aflatoxin on allantoinase activity of germinating seeds. Journal of Research, Punjab Agricultural University, 13: 99-104.

Aflatoxin extracted from Aspergillus flavous on rice reduced the percentage germination and allantoinase activity of germinating P.aureus and P.mungo seeds.

793. Vasudeva, R.S. 1956. Plant diseases of black and green gram round the year. Indian Farming, 6(7):45-46.

Various diseases of mung & urd bean are described with symptoms and control measures.

794. Vasudeva, R.S. 1958. Report of the Division of Mycology & Plant Pathology, Scientific Report of Agriculture Research Institute, New Delhi, 1955-56; 85: 104.

A yellow mosaic virus of mung transmitted by Bemisia tabaci to mung, urd, moth and soybean but not sap inoculation. The disease affected 1% of urd plants raised from seed under insect proof condition.

795. Venkataraman, S. and Subbarao, N.S. 1974. Strain variation of Rhizobium sp. (cowpea group) from root nodules of healthy and yellow mosaic virus (YMV) infected Phaseolus aureus plants. Phytopathologische Zeitschrift, 80: 29-34.

There was no critical difference between Rhizobium strains in relation to infection by mungbean yellow mosaic virus.

796. Verma, H.N. and Kumar, V. 1982. Prevention of plant virus diseases by Mirabilis jalopa leaf extract. New Botanist, 7: 87-91.

Foliar spray of the extract caused marked symptoms suppression, improved growth and flowering and considerably reduced the virus multiplication rate in urd against urdbean mosaic virus. The aphid and whitefly population were much lower on treated than control plants.

797. Verma, H.N., Rastogi, P., Prasad, V. and Srivastava, A. 1985. Possible control of natural virus infection of Vigna radiata and Vigna mungo by plant extracts. Indian Journal of Plant Pathology, 3: 21-24.

Infection of these crops by mung bean yellow mosaic virus under natural conditions was suppreseed by

spray of 4% aqueous partially clarified leaf extracts of Clerodendrum fragrans and Aerva sanguinodenta and root extracts of Boerhaavia diffusa. Extracts from C.fragrans reduced infection by 60%, whereas the other extracts only delayed the appearance of disease symptoms. Flowering and consequent fruiting was advanced increasing nodulation and yield.

798. Verma, M.L. 1985. Control of foliar diseases of urd bean (Vigna radiata var. Mungo). Indian Phytopathology, 38: 600-601 (Abstr.).

Out of 12 varieties, JU 78-16, Pant U-30 and No.55 were moderately resistant to Cercospora canescens while JU 78-5-2, JU 78-16, JU 78-27, Pant U-30 were resistant to bacterial leaf spot (X.campestris pv. vignaeradiatae). Bavistin, benlate were highly effective against powdery mildew and Cercospora but enhanced severity of bacterial leaf spot. Fytolan was highly effective against powdery mildew and bacterial leaf spot but not Cercospora sp.

799. Verma, P.R. and Patel, P.N. 1969. Host range, varietal resistance and epidemiological observations on Cercospora leaf spot disease of cowpea. Indian Phytopathology, 22: 61-66.

Cowpea isolate of C.cruenta did not infect mungbean & urdbean plants.

800. Verma, R.P.S. and Singh, D.P. 1986. The allelic relationship of genes giving resistance to mungbean yellow mosaic virus in blackgram. Theiritical and Applied Genetics, 72: 737-738.

The F_1 of cross between resistant urdbean lines were all resistant to YMV indicating that they (Pant U 84 & U.P.U-2) carry the same resistant gene which was previously reported to be recessive.

801. Vidhyasekaran, P. and Arjunan, G. 1976. Fungicide treatment of black gram seeds for the control of storage fungi. Madras Agricultural Journal, 63:393-395.

Thiram and captan maintained yields after five months or more in storage, while treatment with other fungicides gave reduced yields.

802. Vidhyasekaran, P. and Arjunan, G. 1976. Resistance in some urd varieties against powdery mildew. Indian Phytopathology, 29: 212-213.

Variety Warangal was highly resistant and No.1792 showed very less disease in field and glass house tests.

803. Vidhyasekaran, P. and Arjunan, G. 1978. Studies on leaf blight of urdbean caused by Macrophomina phaseoli. Indian Phytopathology, 31: 361-362.

New leaf blight of urdbean occurred at age of 10-20 days. Veins of top leaves turned brown showing twisting & distortion. They dried & defoliated later affecting petioles & stems. Pycnidia were detected. Varieties resistant to root rot were highly susceptible to leaf blight and viceversa. Isolates did not cause disease when cross inoculated on leaves/ roots. Pycnidia & Sclerotia were bigger in size in leaf isolates as compared to root isolates.

804. Vidhyasekaran, P., Arjunan, G. and Ranganathan, K. 1976. Field tolerance of some green gram types to yellow mosaic. Madras Agricultural Journal, 63:54-55.

Of 18 P. aureus cultivars only LM-220 and PLS 274 showed no symptoms of mung bean yellow mosaic virus, although these two cultivars were susceptible when tested under glass-house conditions.

805. Vidhyasekaran, P., Arjunan, G. and Ranganathan, K. 1976. Field tolerance of some black gram varieties to root rot disease caused by Macrophomina phaseoli. Madras Agricultural Journal, 63:176-178.

Reaction of 17 cultivars of urd bean to M.phaseolina are given.

806. Vidhyasekaran, P., Arjunan, G. and Ranganathan, K. 1977. Resistance in some mung varieties against root rot. Indian Phytopathology, 30: 404.

In field trials with 19 tolerant lines of P.aureus only LM-220 & MS 9385 showed consistant high resistance to Macrophomina phaseolina.

807. Vidhyasekaran, P. and Kandaswamy, D. 1972. Carbohydrate metabolism of Phaseolus aureus infected with obligate facultative parasites. Indian Phytopathology, 25:48-54.

The influence of infection by mosaic virus, rust, Cercospora cruenta and Oidium sp. on starch and sugar content and enzyme activity in mungbean plants are reported.

808. Vignarajah, V. 1977. Mungbean research and production in Sri Lanka. Proceedings I International Mungbean Symposium, AVRDC, Taiwan: 9-11.

MYMV and TRSV drastically reduced the yields. No sources of resistance identified. It is suspected that MYMV strain differs from Indian strains. Peak of white fly population is noted in cooler months (Dec.-Feb.). A minor peak occurs in May-June. TRSV is seed borne in mungbean but not in black gram and occurs from Dec.-Feb. Interspecific crosses between green and black gram were made but seed passes resistance was not obtained in mungbean.

809. Vinayak, M.S. 1977. Field evaluation of fungicides and cultural methods for control of powdery mildew (Erysiphe poligoni) of green gram (Phaseolus aureus Roxb.). M.Sc.Ag. Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri, pp.89.

In fungicidal trial application of sulphur dust (25 kg/ha) or sulphon-80 (0.7%) and PP-586 (0.06%) significantly reduced the disease severity and

infection increasing yield. All the 45 varieties tested were susceptible to powdery mildew. Sowing in the third week of August had minimum disease severity (50.8%) as compared to fourth week of July (95.7%). The increase in yield with late sowing was found fruitful only in drought prone areas.

810. Virmani, S.S., Singh, K.B. and Singh, K. 1976. Note on the screening of green gram germplasm against yellow mosaic virus disease in India. Indian Journal of Agriculture Sciences, 46: 243-245.

Out of 620 P. aureus lines from 14 countries, nine were resistant in the field and in glass house tests. It is suggested that these lines particularly ML-6 which has good agronomic characters could be used in hybridization programme.

811. Vohra, K. and Beniwal, S.P.S. 1979. Effect of mung bean yellow mosaic virus on yield and seed quality of urd bean (Vigna mungo). Seed Research, 7:168-174.

The virus decreased grain yield when plants infected upto 50 days after planting. Insignificant losses were caused in infections at planting or after 60days. Pods per plant, seeds/pod and 1000 seed weight added to the reduction in yield. Infection adversely affected the colour, texture & size of seed. Germination was delayed in seeds from plants infected 10 days after planting. Seeds from infected plants contained higher amount of proteins and aminoacids.

812. Walia, R.K. and Seshadri, A.R. 1986. Chemical control of root lesion nematodes on green gram by seed coating methods. Indian Journal of Agriculture Sciences, 56: 735-737.

Except Aldicarb (1% a.i.), Carbofuran (0.5% a.i.), Fensulfothion (0.25% a.i.) & phorate (1% a.i.), all seed dressers delayed germination. Nodulation was not affected. Carbofuran (0.5 & 1%), aldicarb (1.5%) & phorate (1 & 1.5%) were good for shoot & root dry

weight. All the treatments significantly reduced root and soil population of nematodes. Fensulfothion (1%) was most effective but it reduced plant growth. Aldicarb (1.5%) & phorate (1 & 1.5%) checked nematode population upto 15 days.

813. Walia, R.K. and Seshadri, A.R. 1986. Pathogenicity of root lesion nematode to green gram. Indian Journal of Agriculture Sciences, 56: 792-795.

Six or more root lesion nematodes (Pratylenchus zeae) per g of soil significantly reduced the germination of Pusa Baisakhi green gram. The growth of seedlings was adversely affected by an initial population of 4 nematodes per g of soil. 1000 P.zeae per g of soil were found to be pathogenic level. Nematode multiplication was highest at 10 nematodes/g of soil.

814. WAN Zainum Nik, & Ngehangji 1982. Studies of Rhizoctonia solani Kuhn on mungbean (Vigna radiata (L.)Wilczek). Malaysian Applied Biology, 11: 103-110.

Isolates from infected roots and leaves caused severe pre and post emergence damping off and pod rot. A seed isolate was less virulent. Brassicol was more inhibitory to growth of R.solani followed by thiram, captan and Busan (TCMTB) in vitro.

815. Wang, T.C. and Yang, C.Y. 1976. Mungbean leaf blight-A new disease of mungbean. Plant Protection Bulletin, 17(4): 8-9.

Leaf blight of mungbean caused by T.cucumeris is reported.

816. Welles, C.G. 1924. Studies on a leaf spot of Phaseolus aureus new to the Philippine islands. Phytopathology, 14: 351-358.

Symptoms of leaf spot caused by Cercospora cruenta Sacc. are reported. The use of resistant lines and sowing at a time when the crop is likely to escape the heavy rains are recommended.

817.Wickens, G.M. 1957. Abyan root rot of cotton. Progress Report, Experiment Station Emp. Cott. Gr. Crop. (Aden) 1956-57; 13-15.

A disease similar to cotton root rot developed on other crops including mungbean grown in Abyan scheme is reported.

818.Williams, F.J., Grewal, J.S. and Amin, K.S. 1968. Serious and new diseases of pulse crops in India in 1967. Plant Disease Reporter, 52: 300-304.

A new leaf crinkle on P. mungo probably of virus origin is reported with several other diseases of pulses in India.

819.Wu, L.C. 1965. Physiology of parasitism I. Growth, pathogenicity and toxin production of Rhizoctonia solani Kuhn. Botanical Bulletin Academea Sinica, Taipei, 6: 144-152.

The data presented show a direct correlation between growth, pathogenicity and toxin production in an isolate of R. solani incubated at different temperature. Water extracts from infected mung seedlings confirmed the importance of the toxin in disease development. Gibbrallic acid appeared to reverse its effect.

820.Wu, L.C. 1967. Physiology of parasitism.II. Biochemical changes in the mungbean seedlings infected with Rhizoctonia solani Kuhn. Botanical Bulletin Academea Sinica, Taipei, 8: 271-283.

Infection with R. solani of P. aureus increased the reducing sugars content x 2 and free amino acid x 1.4 within three days, symptoms on the fourth day. Necleic acid and protein contents decreased. Establishment of infection depended on complex of metabolite secreted by the fungus during the critical period of pathogenesis.

821. Wu, L.C. 1969. Physiology of parasitism III. Nitrogen metabolism in mung bean seedlings infected with Rhizoctonia solani. Botanical Bulletin Academea Sinica, Taipei, 10: 95-108.

Dry weight and mositure content of plants did not change due to infection by R.Solani . The protein content in cotyledons in the early stage of infection decreased but increased in the axil. Of the 14 amino acids detected, some decreased in infected plants & others increased. Flow of amino acids from cotyledons to axil parts was affected. No qualitative differences were observed in the composition of free amino acids in healthy and diseased plants.

822. Wu, L.C.1969. Physiology of parasitism IV. Rhizoctonia metabolites- amino acids and others. Botanical Bulletin Academea sinica, Taipei, 10: 109-123.

Of 15 amino acids synthesised by R.solani DL-threonine stimulated, whereas DL-alanine, L-serine, L-cystine and DL-methionine inhibited growth of mungbean. Auxin and gibberellin like substances were found in the culture filtrates of the fungus.

823. Wu, L.C. 1973. Changes in some enzymes of mungbean seeds germinated on mycelial macerates of Rhizoctonia solani . Physiological Plant Pathology, 3: 19-27.

Marked increase in phosphorylase and glutamate dehydrogenase activities were observed in cell free extracts from seeds of P.aureus after two hours exposure to R.solani. Subsequently the differences in enzyme activity in extracts from healthy and diseased seedlings gradually diminished while aldolase activity declined in infected plants and glucose 6-phosphate dehydrogenase decreased at first and then increased until symptoms appeared. Amylase activity was higher in diseased than healthy seedlings.

824. Yadav, H.C., Chand, J.N. and Saharan, G.S. 1981. Inheritance of resistance in mungbean to bacterial leaf spot. Haryana Agricultural University, Hissar 1981. pp.580-583.

Resistance to X. (campestris pv.) phaseoli in mung lines Jalgaon 781, ML-8 & ML-10 was governed by a single recesive gene.

825. Yang, C.Y. 1977. Mungbean diseases and control. Proceedings I International Mungbean Symposium AVRDC, Taiwan: 141-146.

Diseases of mungbean and urdbean are reported from Philippines of which nine are fungal, two bacterial, 3 caused by nematodes and 11 viruses.

826. Yein, B.R. and Singh, Harcharan 1982. Effect of pesticides and fertilizers on the population of white fly and incidence of yellow mosaic virus in green gram. Indian Journal of Agricultural Sciences, 52: 852-855.

Application of aldicarb (which effectively reduced B.tabaci population) alone or with endosulfan and captan reduced mungbean yellow mosaic virus by 31-39% and 25-46% when compared with the control, respectively. Incidence was also reduced by aldicarb + fertilizers. Fertilizers alone increased incidence of vector and virus.

827. Yein, B.R., Singh, H. and Chhabra, H.K. 1977. Effect of pesticides on the root Knot nematode infesting mung. Indian Journal of Nematology, 7: 117-122.

828. Young, P.A. 1949. Charcoal rot of plants in East Texas, Texas Agricultural Experiment Station Bulletin No.712.

Among the diseases of several other crop plants, charcoal rot of mungbean caused by R.bataticola is reported from Texas.

829. Zainum, W. and Hasbullah, M. 1982. Storage of mung bean seed (Vigna radiata (L.) Wilczek) inoculated with four species of Aspergillii. Pertanika, 5:212-218.

Infection due to Aspergillus flavus, A. fumigatus and A. parasiticus was more than 80% after 18 weeks of storage at 95% RH. Maximum infection of 90% by A. niger was obtained after 9 weeks at 95% RH but thereafter infection decreased, possibly due to bacterial antagonism. At 30 and 50% RH infection by A. fumigatus was lowest and by A. flavus highest after 18 weeks. Seeds stored at 30 and 50% RH showed no decline in germination, even after 18 weeks, but at 95% RH germination declined after the 12th week.

830. Zaki, M.J. and Ghaffar, A. 1987. Effect of Rhizobium spp. on Macrophomina phaseolina. Pakistan Journal of Scientific and Industrial Research, 30:305-306.

Indigenous isolates of Rhizobium from Pea, lucern & soybean significantly reduced severity of Macrophomina root rot of mungbean in greenhouse experiment.

831. Zapromotov, N.G. 1928. Work done in 1926 by the Phytopathological station, Report for 1926. La Defense des Plant Leningrad, v,1: 75-79.

Several diseases including rust of urd bean are recorded for the first time in 1926 in the region of Tashkent.

832. Zapromotov, N.G. and Gafurov, R.K. 1972. Control of infectious diseases of Oregon pea. Zashchita Rastenii, (7): 27.

In Uzbekistan Oregon pea (Phaseolus aureus) is attacked by Rhizoctonia solani and Thielaviopsis basicola. In seed treatment trials 50% thiram and copper trichlorophenolate reduced infection.

833. Zaumeyer, W.J. and Thomas, H.R. 1957. A monographic studies of bean diseases and methods for their control. USDA Technical Bulletin No.868.

Diseases of beans with their detailed symptoms and control are described. It include some bacterial diseases of mung bean also.

834. Zote, K.K., Dandnaik, B.P. and Jature, S.D. 1981. Chemical control of foliar diseases of mungbean (Vigna radiata). Pulse Crops Newsletter, 1(2):68.

In a field trial, all the fungicides reduced intensity of powdery mildew and Macrophomina leaf blight significantly below the control and increased the yield. The best was bavistin 0.5 kg/ha followed by Karathane 0.5 kg/ha with an yield of 8.43 & 7.96 q/ha as compared to 1.72 q/ha in control.

835. Zote, K.K., Dandnaik, B.P. and Khalikar, P.V. 1983. Reaction of mung cultivars to Macrophomina blight. Journal of Maharashtra Agricultural UNiversities, 8: 146-147.

None of the 14 Vigna radiata varieties were immune but 5 were resistant.

836. Zote, K.K., Khalikar, P.V. and Dandnaik, B.P. 1985. Efficacy of fungicides against powdery mildew of mung Pesticides, 19(8): 42-43.

In a plot test with 9 fungicides, bavistin gave excellent control of E.polygoni on mung.

837. Zote, K.K. and Mayee, C.D. 1982. Influence of fungicidal seed treatment during storage on seed borne fungi of mungbean. Pesticides, 16(4):10-12.

Seed treatment improved germination of mung bean. The best results were obtained with bavistin followed by thiram and Dithane M-45. All the fungicides inhibited fungal growth and all except Difolatan improved seedling vigour.

ADDENDA

838. Abbaiah, K., Subba Rao, M., Seenaiah, P. and Satyanarayana, A. 1988. Evaluation of mungbean genotypes against badterial leafspots. Indian Journal of pulses Research, 1:67-68

At Lam Guntur, Leafspot of mungbean (X.campestris pv. vignaeradiatae) was high at temperature 25-30°C and R.H.80%. Germplasm lines were scored on 1-9 point scale. A radiation induced mutant of Pant Mung-2 was highly resistant. ML-5 was MR. In addition 10 entries were M.R.

839. Amin, K.S., Grewal, J.S., Varma, A. and Williams, F.J. 1968. Screening of mung and urid genetic stock for disease resistance. Proceedings 2nd Workshop Conference on Pulse Crops, IARI, New Delhi.

In screening tests, L.24-2, 15225 and 15227; Hyb.4-3A, Hyb.12-4, ML.65, ML 62 were resistant to MYMV & recommended for use in breeding programme. For leaf crinkle field resitance inurdbean varieties N.212 & 1766 was observed.

840. Amin, K.S., Singh R.A., Vishwa Dhar and Gurha, S.N. 1988. Changing funal disease situation in Pulse crops. Proceedings National Seminar on changing pest situation in the current Agriculture Scenario of India, pp.68-69.

An account of diseases of different pulses is given as per present situation. Fungal diseases of mungbean and urdbean are powdery mildew (E.polygoni), Cercospora leaf spot (C.canescens and C.cruenta), anthracnose (C.lindemuthianum and C.capsici), Macrophomina leafblight (M.phaseolina), root rot and leaf blight (R.solani).

841. Bajet, N.B. and Castillo, M.B. 1974. Effect of Rotylenchulus reniformis inoculations on mungbean, soybean and peanut. Philippine Phytopathology, 10:50-55.

Results on pathogenicity of renbform nematode and its effect on mungbean plant are reported.

842. Bopaiah, B.M., Patil, R.B. and Reddy, D.D.R., 1976. Effect of Meloidogyne javanica on nodulation and symbiotic nitrogen fixation in mung, Vigna radiata. Indian Journal of Nematology, 6:124-130.

The nematode inferferes with the nitrogen fixation in green gram by Rhizobium sp.

843. Chenulu, V.V. and Varma Anupam, 1988. Virus and virus like diseases of pulse crops commonly grown in India. In "Pulse Crops" Edited B. Baldev, S. Ramanujam and H.K. Jain, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, pp. 338-370.

Reviewed the virus diseases of pulse crops which include yellow mosaic & phyllody of mungbean and leaf crinkle, leaf curl, mosaic (Mosaicmottle due to BCMV), Phyllody and yellow mosaic of urdbean.

844. Chohan, J.S., Kalia, H.R. 1967. Virus diseases of Phaseolus mungo L. and their control through resistant varieties. Proceedings, I Pulse Workshop Conference, I.A.R.I., New Delhi, pp. 65-67.

Results on varietal screening of urdbean against virus diseases in Punjab are reported.

845. Chowdhury, A.K. and Chowdhury, S.R. 1983. Effect of urdbean leaf crinkle virus, ULCV, on plant morphology and yield contributing characters of cultivar T-9. Pulse Crop Newsletter, 3:54-55

The virus reduced plant height root length, nodules/plant, pods/plant, length of pod, seeds/pod and 100 seed weight to an extent of 19.6, 5.3, 33.7, 84.0, 83.4, 27.0 & 11.6%, respectively.

846. Das, S.N., Mishra, C.D. and Mohanty, K.C. 1979. Indian Journal of Nematology, 9:74.

Meloidogyne incognita reported on mung from Orissa.

847. Grewal, J.S., Mahendra Pal and Kulshrestha, D.D.1988. Fungal diseases of pulse crops. In "Pulse Crops" Edited by B.Baldev, S.Ramanujam & H.K. Jain. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, pp.259-315.

The description on fungal diseases of pulse crops is given in detail. It includes Cercospora leaf spot dry root rot & stem rot, web blight, powdery mildew rust & other minor diseases of mungbean & urdbean.

848. Gurha, S.N., Misra, D.P. and Singh, R.A.1984. Yield stimulatory potential of temic and disyston in urid. Pesticides, 18(8):34-35.

Application of systemic insecticide Temic and disyston checked the yellow mosaic on urdbean and increased the yield giving higher return.

849. Huang, C.S. et al., 1972. Plant parasitic nematodes in Taiwan. Monograph Ser. No. 1, Institute of Botany Academia Sinica, Taiwan. Republic of China.

Reported Meloidogyne incognita and other species of nematodes parasitizing mungbean roots.

850. Huang, C.S. et al. 1976. Screening for varietal resistance to Rhizoctonia damping off in mungbean and other legumes. Plant Protection Bulletin, 17(4):8.

Varieties of mungbean resistant to damping-off (Rhizoctonia sp.) are reported.

851. Jalali, B.L., Khirbat, S.K. and Sangwan, M.S.1981. Proceedings ot the National Seminar on disease resistance in crop plants, Tamil Nadu Agricultural University, Coimbatore, pp.131.

Indicated ML-26, ML-9, 11157 and ML 70-10 showing resistance to C.cruenta, R.solani, X.phaseoli, MYMV and leaf crinkle virus. L 24-2, LM 696, 15225 and 15229 showed resistance to MYMV.

852. Jindal, J.K. and Patel, P.N. 1988. Bacterial diseases of pulse crops. In "Pulse Crops", edited B.Baldev, S.Ramanujam & H.K.Jain, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, pp.316-337.

Described bacterial diseases of pulse crops in detail. Mungbean diseases include bacterial leaf spot (X.campestris pv. vignaeradiatae) Halo blight (P.syringae pv. phaseolicola). On urdbean bacterial leaf spot caused by X.campestris pv. phaseoli, urdbean strain, is described.

853. Lilhore, D.R.1988. Studies on epidemiology and control of leaf blight of urdbean caused by Rhizoctonia bataticola. M.Sc.Ag. thesis, R.A.K. Agriculture College, Sehore, M.P., India, pp. 87.

The leaf blight pathogen (R.bataticola = Macrophomina phaseolina) was detected from seed coat, cotyledons as well as embryo of black gram. The pathogen reached to foliage through water splashings. Environmental factors influneced 'r' & 'A' values of disease development. Results on fungicidal efficacy in vitro and in vivo and screening for resistant are also given.

854. Manjunath, A. and Bagyaraj, D.J. 1986. Response of black gram, chickpea and mungbean to vesicular-arbuscular mycorrhizal inoculation in an unsterile soil. Tropical Agriculture, 63:33-35.

Inoculation of both crops with Glomus fasciculatum increased the dry weight and P content of the shoot and root over the uninoculated control. Application of P did not reduce the percentage root colonization by VA- mycorrihizal fungi but increased the number of extra material chlamydospores in the soil. P application also increased the dry weight and P content of the inoculated plants suggesting the need for application of P to obtain maximum benefit from VA mycorrhizas in P fixing soils.

855. Muniyappa, V., Reddy, H.R., Shivshankar, C. and Sreekantaradhya, R.1976. Varietal response of green gram (P. aureus Roxb.) to the green gram yellow mosaic disease. Current Research, 5:100-101.

856. Nair, N.G. and Nene, Y.L. 1973. Studies on the yellow mosaic of urdbean (Phaseolus mungo L.) caused by mungbean yellow mosaic virus. I. Transmission studies. Indian Journal of Farm Science. 1:109-110.

857. Nene, Y.L.1973. Note on a fungus parasite of Bemisia tabaci Genn., a vector of several plant viruses. Indian Journal of Agricultural Sciences, 43:514-516.

The fungus Paecilomyces farinosus was found parasitizing Bemisia tabaci, the vector of MYMV.

858. Rathi, Y.P.S. & Nene, Y.L.1974. A technique for handling whitefly adults in serial transmission of viruses. Indian Phytopathology, 27:459-462.

A method for easy handling of whitefly adults, the vector of MYMV, during transmission study, has been described.

859. Samuel, C.S., Janarathnam, R., Kandaswamy, T.K. and Subramanian, K.S. 1972. New hosts for yellow mosaic virus of Dolichos lablab L. Current Science, 41:686-687.

Mungbean is reported to be a host of yellow mosaic virus infecting D.lablab.

860. Singh, Dharampal 1954. Phyllody in mung (Phaseolus aureus L.). Science & Culture, 20:194.

A typical phyllody of mungbean was described as a potentially dangerous disease but incidence at present is observed upto 0.5% only in North India.

861. Singh, D.P. and Sharma, B.L. 1981. Madras Agriculture Journal, 68:289-295

The germplasm lines of mungbean 11/99, 11/395 and 16-303-20-3-g were reported as resistant to MYMV and Cercospora sp.

862. Sivaprakasam, K., Jagadeesan, M., Kannapiran, C.1976. Mineral content in the healthy and yellow mosaic infected blackgram. Annamalai University, Agriculture Research Annual, 6:171-173.

863. Thakur, R.P., Patel, P.N. and Verma, J.P.1977. Genetical relationships between reactions to bacterial leaf spot, yellow mosaic and Cercospora leaf spot diseases in mungbean (Vigna radiata). Euphytica 26:765-774.

864. Verma, G.S., Verma, H.N. and Mukerjee, Ketki 1973. Varietal screening of urd and mung against virus diseases. Proceedings , 60th Indian Science Congress, Part III , pp.668 (Abst.)

AUTHOR INDEX

ADDENDA

SUBJECT- INDEX